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Medical
erials

Vol. XXXII

Part 6.

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THE AGRICULTURAL GAZETTE OF

STORAGE

NEW SOUTH WALES

JUNE
1921

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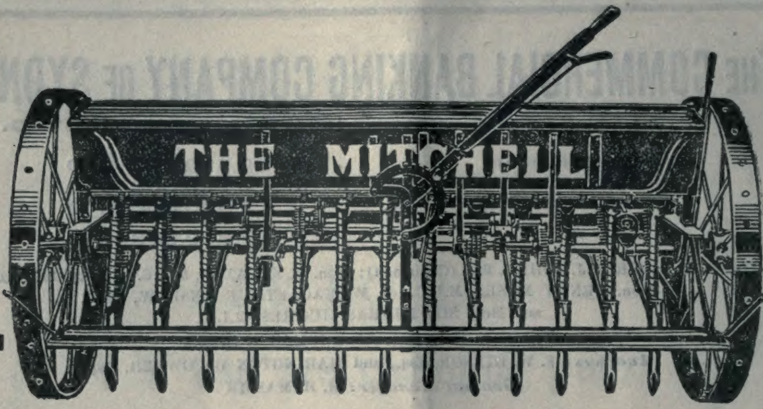

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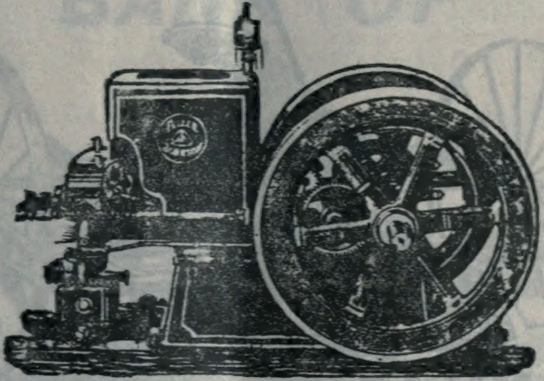

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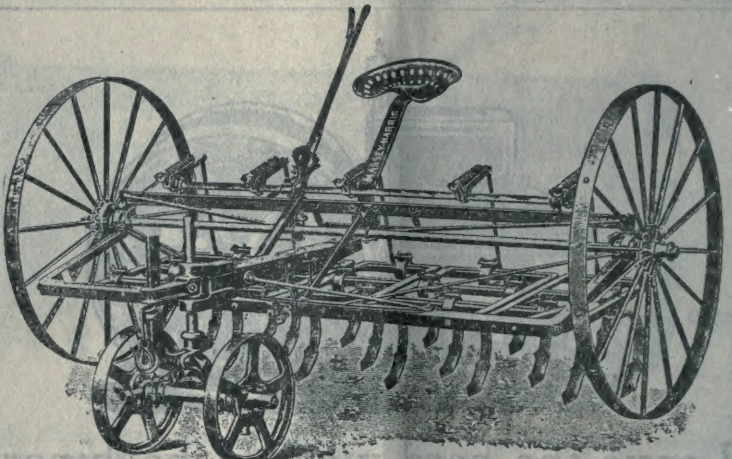

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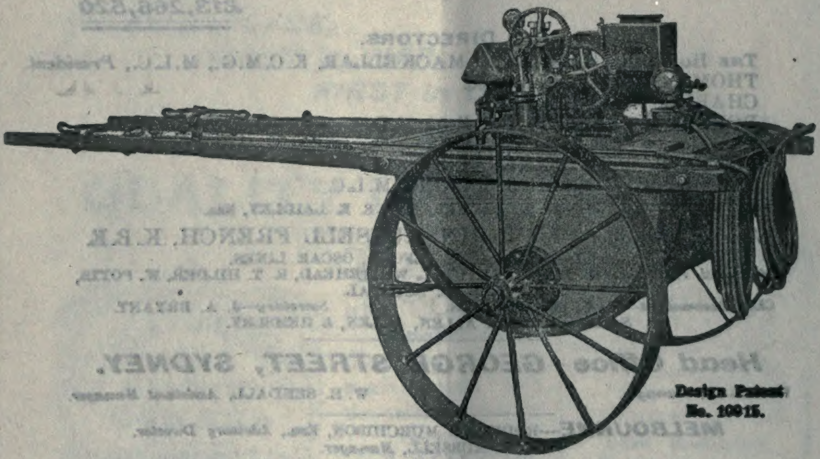

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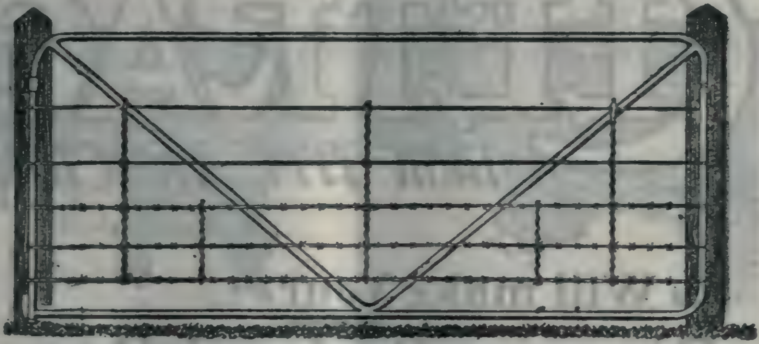

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Isabel's Majestic (881 A.A.H.B.).

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Yield of Dam, 8,563 lb. milk and 351 lb. butter in 273 days.

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Yield of Dam, 10,324 lb. milk and 487·56 lb. butter in 273 days.

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Yield, 11,240 lb. milk and 530·04 lb. butter in 365 days.

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PURE-BRED YOUNG BULLS of the following breeds—MILKING SHORTHORN, JERSEY, GUERNSEY, AYRSHIRE, and RED POLL—always available for Sale.

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Sire, Godolphin Moses (imp.).

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Yield of Dam, 6,999 lb. milk and 451 lb. butter in milking period.

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Parson's Red Rose VII of Wollongbar (342).

Yield, 5,907 lb. milk and 372·55 lb. butter in 273 days.

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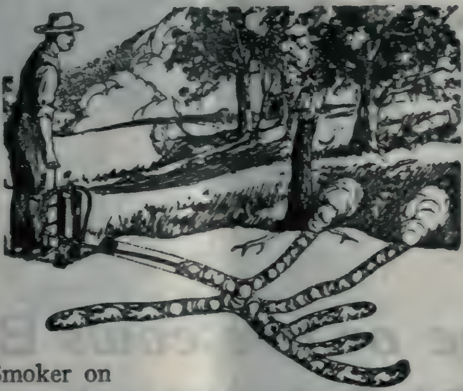

The Patent Smoker on

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indicates all outlets, and when these outlets are closed it is only a matter of one or two minutes to kill everything in the burrow.

This smoke is made without fire or heat, and enters the burrow mixed with the Carbon Fumes. Not only is every escape hole instantly shown up, but you know for certain that wherever the smoke shows there the Carbon Fumes have also reached.

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No. 2 Double Acting Suddeth	7	0	0
Patent Smoke Mixture, per box	0	15	6
Carbon Bisulphide, per 5-gal. drum	2	18	0

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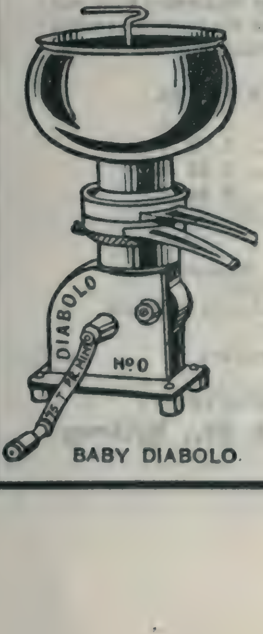
BABY DIABOLO is just as perfect in construction and operation as its bigger brothers. Specially built by the world's largest separator factory for separating the milk of just one or two cows —it's a little beauty at any price.



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Don't be satisfied with pansetting or any other separator until you investigate BABY DIABOLO. Send now for post free Folder, giving prices and particulars of the full range of Diabolos. There's one for every herd, large or small.

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SEPARATOR CO. LTD.
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SHORTER HOURS ON THE FARM!

The "FORDSON" *saves from 30 to 50 per cent. of the farmer's time.*
The "FORDSON" *does the work of six horses.*
One man with a "FORDSON" *can do more work easier than three operating in the old way.*
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MOTOR TRACTORS LTD. :: :: **112-114 Hunter Street, SYDNEY.**

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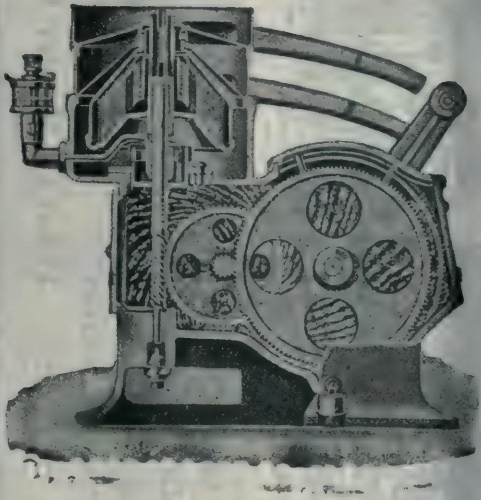

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The new low set frame allows of gears being arranged to ensure perfect self-oiling—makes them accessible, yet dustproof—and brings the milk-receiver to a convenient working level.

The lower part of the frame forms an oil reservoir which is filled by simply lifting the top cover of frame when the machine is operated for the first time.

The 3 or 4 drops of oil per minute delivered by the sight feed lubricator pass through the neck-bearing and down the spindle.

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The Domo is easy to turn and gears give maximum wear

The main driving wheel carries oil to the worm wheel, which in turn throws the oil as a fine drizzle all over the moving parts. The "splash lubrication" of the gear is so designed that no grit or metal particles can be thrown into the bearings.

Not only is the wear on gear and bearings slight, but the consumption of oil is remarkably low too.

There are other Domo features of particular interest to dairymen. Write for catalogue containing full description.

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Galvanised High Grade

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Manufactured by Bruntons, Musselburgh, Scotland,

Sole Agents for Australia— **GIBSON & SONS,**
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1 mile 5-wire fence, 12 x 14 gauge Buffalo, costs £22 11s. 6d., and has 300-lb. greater breaking strain than No. 8 Galvanised, which costs £45 2s. 6d. for 1 mile 5-wire fence.

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1 Ton of 12 x 14 G. measures 19 miles.
1 Ton of No. 8 Galvanised measures 6 miles 880 yards.

We also stock 11 x 13, 10 x 12 Buffalo Oval, which shows the same saving and greater strength over No. 6 and 7 ordinary fencing wire.

BRUNTON'S HIGH GRADE FENCING WIRES HAVE THE FOLLOWING ADVANTAGES:

A. It costs £4/10/3 per mile less than No. 8 Gal.
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C. It is three times the length of ordinary Gal. Wire.
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I. It Saves the Cost of Re-straining and reduces Labour Cost.

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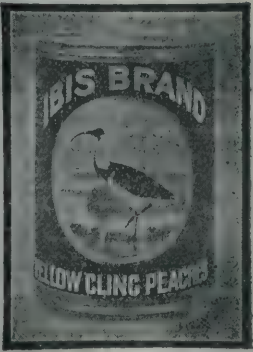

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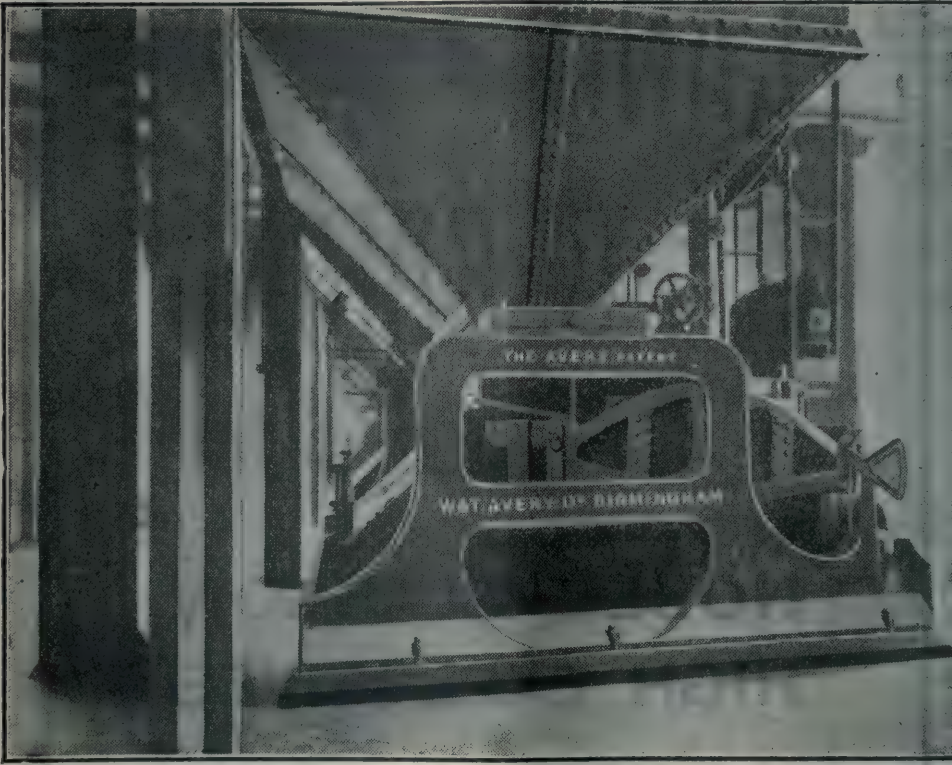

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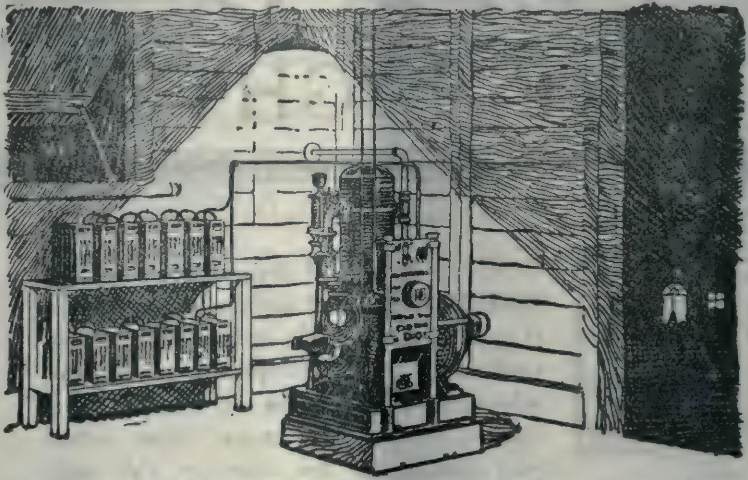

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Vol. XXXII. *Part 6.* *JUNE 2, 1921.*

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OF

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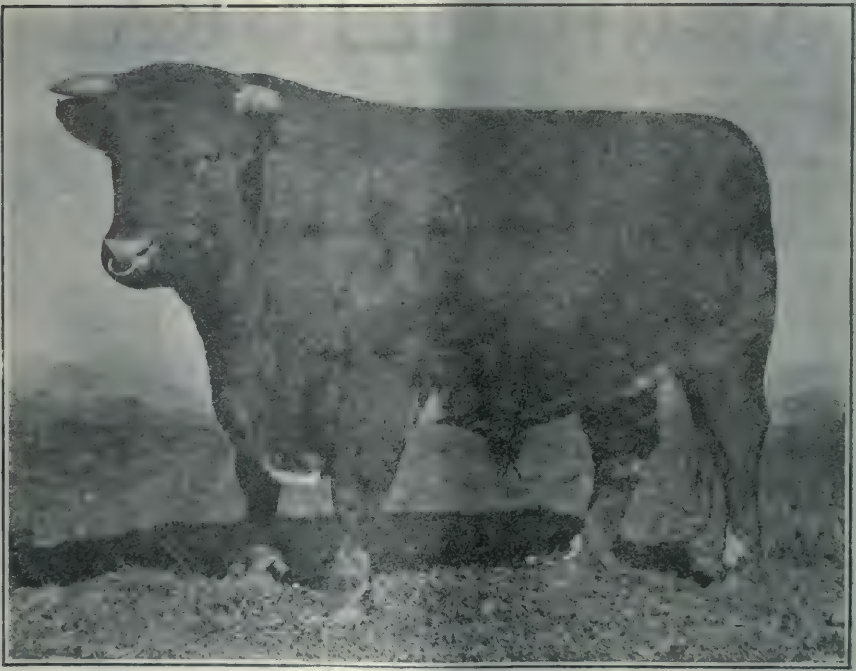

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2nd June, 1921.

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The Manager, Retford Park, Bowral, N.S.W.

VOL. XXXII. PART 6. JUNE 2, 1921

Agricultural Gazette of New South Wales.

The Feeding of Sheep in Times of Drought.

[AT the termination of the 1919-20 drought, circulars were issued by the Stock Branch with a view to the collection of information on the methods of feeding sheep during the preceding months of scarcity. Valuable information was provided by several stock inspectors and others, particularly by Mr. C. J. Woollett, Stock Inspector at Tamworth. From these replies and other sources, the following excellent article has been compiled by Mr. W. L. Hindmarsh, B.V. Sc., D.V.H., one of the Veterinary Officers of the Branch.—S. D. SYMONS, Chief Inspector of Stock.]

THE question of feeding sheep during the periods of drought that occur at intervals in New South Wales is of utmost importance to the grazier. Not only is this necessary in the interests of the individual owner himself, but the losses of individuals affect the economic position of the State as a whole, and it is necessary, from a national point of view, to conserve our flocks and herds to the very best of our ability. It is known by all interested in the animal industry that the breeding stock—particularly lambing ewes—suffer earlier and more severely than the dry stock, and the task of re-building our flocks and herds is rendered the more difficult by that very fact.

With the object of gaining as much information as possible from the men of actual experience in the past drought, the Inspectors of Stock of the various Pastures Protection Districts were last year asked to communicate with the farmers and graziers of their respective districts with a view to learning the following :—

1. How severely the district was affected.
2. Fodders used during the drought.
3. Amounts of feed used during specified periods.
4. Numbers of stock fed.
5. Methods of feeding adopted.
6. Classes of stock fed, especially referring to breeding stock.
7. Approximate daily cost per animal.
8. General results achieved.

It is to be regretted that many who did answer the circulars did not see their way to give definite information, especially regarding the numbers fed, and the average cost per day. Further, in comparatively few cases was it possible to give information regarding definite periods of time during which feeding was carried out. On the whole the main effects of the drought were felt on the country west of the Dividing Range. In few instances were the coast and tablelands seriously affected, and they served to provide agistment for many thousands of sheep from the western plains; certain parts of the coast were without rain, however, especially towards the end of the drought, and there stock suffered in consequence.

In considering a problem of such magnitude the different conditions under which stock are kept in the various districts, the facilities for making or obtaining the fodders at a reasonable cost, and the methods of feeding, are all of importance. In addition, the possibilities of successfully weathering a season of drought depend upon the individual grazier, and the care and attention he is able or willing to devote to his flock. His methods will depend largely on local conditions, and no one method of feeding nor any single class of fodder can receive universal recommendation. At the same time the number of fodders available for hand-feeding is limited to the crops commonly used in the State, and the reports received, though coming from many districts with considerable variation in soil and climate, show a similarity in the fodders adopted. The deciding factors when it comes to the point of actually feeding the flock are—

1. The fodder available.
2. The cost, including transport and labour.

Anticipate Periods of Scarcity.

Before turning to a discussion of the fodders actually used during the recent drought and the methods of feeding them employed, it will be useful, perhaps, to discuss some of the general considerations that enter into the problem. It is possible by the adoption of conservative principles of station management to reduce the risks connected with the business in a very material degree, and among such principles we may particularly mention the avoidance of overstocking, and the improvement of the pastures.

Avoid Overstocking.—This seems commonplace advice, and it is referred to with great regularity whenever stock are suffering from a shortage of food. Actually the problem is more complex than it appears on the surface. In a good season the growth of herbage is so profuse that stock cannot possibly keep it down. It is trampled underfoot and lies in a tangled mass on the ground. Should further rain ensue it rots, and later new herbage grows through it. If it dries it is available as food during the following months, and it is especially valuable if it has seeded well, for sheep will then readily fatten on it. This, of course, does not apply to those grasses which produce the hard pointed seeds that are the source of much harm to the sheep and its wool, although such grasses may provide good feed when in a young stage. It is not to be wondered at, perhaps, that with a profuse supply of natural fodder the grazier is tempted to purchase more sheep, with the idea of fattening them and sending them to market. On the other hand, it is well known that many pastures have been depreciated in value by constant overstocking.

Actually the sheepowner should aim at keeping that number of stock which will enable him at the threat of a dry season to dispose of his wethers and surplus ewes, so that he may have sufficient feed left to carry on with his breeding stock. This must be done before the sheep show signs of loss of condition, and the pastoralist must reckon at the time what sheep he can afford to keep and what will be the probable cost of hand-feeding them.

Even if he is unable to obtain what he considers their market value, it is better to lose a little on their value at once than be put to the worry and expense of finding agistment and feed at famine prices, with the probability that in addition a great number will eventually be lost.

The most valuable stock—those that should be saved—are the young breeding ewes, these being the foundation of the future flock. Hence if it is decided to dispose of any of the stock, the wethers and broken-mouthed ewes should be sold first. Young ewes of fair quality will be valuable after the drought has broken, and will repay the cost of being kept through the bad season.

Permanent Improvement of the Pastures.—The possibility of the pastures of the property being permanently improved should receive consideration. Several factors have affected the carrying capacity of much grazing country in recent years. They are chiefly:—(*a*) drought; (*b*) overstocking; (*c*) admission of sheep travelling from other districts; (*d*) effect of flood waters.

Much of the natural herbage has been replaced by weeds that are largely useless for grazing purposes. In some cases the spread of these pests has been alarming, and the question of their eradication and replacement with good, edible herbage is worthy of very serious consideration. This aspect of the question is rarely faced by the grazier, in spite of the work of the scientific officers of the Agricultural Department, who constantly urge the trial of various grasses and plants which have been proved to be of exceptional value when planted in many parts of the State.

Edible Trees and Shrubs.—Similarly, the provision of belts of edible shade trees which could be lopped when necessary is of highest importance. Such belts are not only of importance as emergency fodder, but also act as shelter from the weather, both in summer and winter. The sheepowner should do all in his power to encourage the growth of such valuable trees, instead of carelessly cutting them out, as has so frequently been the case in the past.

Some Points in Hand-feeding.

Commence Hand-feeding Early.—It is important when a dry spell occurs not to wait until the sheep have lost condition and strength before starting to hand-feed. The weakness of a sheep that has been starved is reflected in all the internal organs, and such an animal is unable to assimilate the nourishment in the food which it ingests. It can easily be understood that there is far more chance of keeping up the condition of a healthy sheep than of one with a constitution already weakened by lack of nourishment. The hand-feeding might be commenced with small amounts while there is yet a little natural food.

Bulk Necessary when Grain is Fed.—Edible scrub, hay, dried grass, leaves, etc., all help to keep active the voluminous digestive organs of ruminants. These organs are accustomed to dealing with large masses of food, and they will not efficiently do their work with small amounts of concentrated fodder. The feeding of grain alone without the addition of some roughage will be attended with disaster. In this connection, the straw, which is held of little account in many wheat districts, would be of inestimable value in drought time for making up the bulk of fodder so necessary to the digestive system of the sheep. The cost of saving it would be amply repaid by the number of sheep kept in health.

Maintain the Health of the Flock.—Where food of a coarse, harsh nature is used—and this applies very particularly to edible scrub—it is necessary to give some laxative in order to prevent impaction of the bowels. The large amount of fibrous matter in these foods, together with lack of water, tends to the formation of matted masses and balls of indigestible matter in the stomach and intestines. To combat this, molasses, Epsom salts, salt, etc., may be used in solution or as a lick. In purchasing a proprietary lick make certain that it contains no astringent salt, such as sulphate of iron.

When to stop Hand-feeding.—After the first rains have fallen and grass and herbage make their first shoot, hand-feeding should not at once be discontinued. The young green stuff does not contain much nutriment, and it is very laxative in action. The sudden change of diet is liable to cause severe scouring, so that hand-feeding should be continued until the natural food available is able to supply the necessary nutriment. Another reason for continued feeding is that the change of weather often has a detrimental effect on the sheep, and they are liable to be lost if not kept in good heart. Often it will be noted that in spite of their hunger sheep do not take to the young herbage at once. Many stockowners have drawn attention to the fact that their losses were heavier after the rain than during the drought, and much of the loss has been due to the sudden discontinuance of hand-feeding. These losses are, of course, quite apart from those due to flood waters, or to sheep being cut off from assistance, and are most often noted in lambing ewes.

Mixed Feeds are Advisable.—In hand-feeding no one food is sufficient to keep up the animal's strength. Under normal grazing conditions stock have the selection of a variety of herbage, and in artificial feeding variety should still be provided. To do this a balanced ration—that is, a ration combining all the constituents necessary for the health and natural growth of the body—should be adopted. This is best obtained by the use of grain, combined with some leguminous fodder. Of course, it is understood that these are not always available, or the prices may be prohibitive, and the grazier may be compelled to make what arrangements he can, according to local circumstances. It is also advisable, where it can be carried out, to vary the food so that the sheep may have a change of diet. This is of considerable advantage to the natural economy of the animal's body, and the sheep relish the change and will keep in better strength because of it.

Feeding should be Regular.—Even if the amounts given are only small, feed should be supplied regularly. At first the sheep will need to be mustered, but with regular feeding this soon becomes unnecessary. A little food given daily will produce better results than larger amounts at irregular intervals.

Give Special Attention to Weak Animals.—Arrangements must be made to feed the weaker sheep apart from the remainder of the flock. Under ordinary conditions the stronger and more pugnacious sheep get more feed than the weak. This is especially the case where troughing is used. There should be at least nine inches of troughing to each sheep. If the food is fed from the ground it should be trailed or scattered in such a way as to give all the sheep an equal chance. If necessary, the poorer sheep should be drafted off into a different paddock and fed separately; otherwise they will be robbed of their ration and death will result. Similarly, lambing ewes as they drop their lambs should be placed in a separate paddock, where they will not be hindered by the lambs from obtaining their food. If this is not done the ewes either lose their rations or forsake their lambs in order to get their own food.

The Care of Lambing Ewes.—Lambing ewes should be fed before the time of parturition approaches. In many cases it is not until a week before lambing that it is decided to feed the ewes, but there is just as much drain on the vitality of the ewe while the foetus is "in utero" as when it is born, and just as much dependence on the mother for nutriment. The ewes should be fed, if it is necessary to feed at all, during the whole period of gestation—not just at the latter end, as is usually the case.

Should the ewes forsake the lambs, special feeding is necessary. If the lambs are allowed to take their chance with the remainder of the flock heavy losses will result. Grain should be boiled or soaked before being fed to such young stock, and care must be taken that it has not soured.

Feed in Small Mobs.—It is recommended that feeding be undertaken in small mobs. There should be never more than 1,000 in each case, while better results will be obtained where the mobs are only 500.

The Water Supply.

It is not the intention in this article to deal in detail with the quality of water supply upon a farm. The whole matter has been fully discussed by Mr. F. B. Guthrie in this *Gazette* (Vol. XXIX), where recommendations regarding water and its purity are set out. The water that sheep receive during a drought depends on the local conditions. It is known to all graziers that sheep are fastidious about their water supply; be it tank, river, or bore, they take a liking to it, and will often refuse water from other sources. As the river or tank begins to dry the percentage of vegetation and mineral matter in it increases, and the sheep continue to drink it. If droved to another tank or supply they may refuse to drink for some days, especially if it is clear and free from rubbish.

These facts, however, do not affect the general principle that water for stock should be as fresh and pure as possible. Because sheep have taken a liking to a pool of muddy water, full of decaying weeds and vegetation, is no reason why they should be permitted to use it if another and better supply can be obtained. Such water not only contains the impurities referred to, but also enormous numbers of putrefactive bacteria. Owing to shortage of food, the animals' system is already weakened, and these foreign matters irritate the digestive organs and have a far more dangerous effect than in normal seasons.

Watering, at all times and seasons, is far better carried out by troughs. Even in the western districts, it is often possible to sink wells and raise the water with windmills. The water so obtained is in every way preferable to that saved in tanks. It is clean, fresh, and cool, and has not the sediment of mud and dung which is usually present at the open end of a tank where many animals water. In addition, the supply is far more likely to be permanent. The necessity for troughs in sheep paddocks watered by bore drains is not so great, since the sheep have a great length of drain at which to water, and the water is not stagnant. A further advantage of watering from troughs lies in the fact that sheep are less liable to infection from parasitic worms, which danger always exists about open tanks.

Where, however, these tanks are the only supply available, steps should be taken to purify the water which has become foul and heavily charged with decaying vegetation and mineral matter. Water containing much mud may be clarified with lime or alum. If it contains much decaying organic material, it contains as well numerous putrefactive bacteria. At all times this is unsuitable for stock, but in drought times the sheep are more liable to gastro-intestinal derangements, and this at the very time when the water is more heavily charged with harmful bacteria. The purification of such water can be accomplished by the addition of chloride of lime. Members of the Australian Imperial Forces will recall the fact that all water used in France was purified in this way. Water was drawn from various sources, often contaminated by the proximity of dung heaps and rubbish, yet there was very little disease carried by water. One part of chloride of lime to one million parts of water was effective. More details of this treatment will be found in this *Gazette*, June, 1912.

The watering of sheep should be carried out regularly. When fodder is being provided by lopping trees, those within the vicinity of the water supply are certain to be cut out first, and the sheep may presently need to be shepherded from the fodder to the water and *vice versa*. Similarly, it may not be possible to feed artificially on other forage near the water, and in such cases also it may be necessary to shepherd the sheep to and fro. This travelling, provided it is not excessive, is an advantage as it ensures that the sheep have exercise. Otherwise, the sheep have a tendency to wait about the feeding-ground until the waggons arrive with the daily ration, thus losing the exercise usually obtained when grazing. Travelling the sheep should, of course, be limited to the cooler hours of morning and evening.

The need for water during the hot months, especially when the sheep are fed on dry feed, is very great, and it should be seen that the sheep have access to water at least twice daily.

(*To be continued.*)

Producing Lucerne Hay under Irrigation Conditions.

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F. G. CHOMLEY, Manager, and F. A. CHAFFEY, Farm Foreman.

LUCERNE growing for hay has in late years become a feature of some importance on this farm, and so profitable that the area has been extended year by year, until there are now 120 acres under crop, with an average production of six or seven cuts per season, and a reputation among consumers that ensures a good market for every truck forwarded to Sydney.

The methods adopted have been attended with such success as to suggest that settlers on the Murrumbidgee Irrigation Areas may yet regard lucerne as having possibilities for them. The history of this crop on the area has no doubt been checkered, and the suspicions entertained by many settlers are not without foundation and perhaps justification, but the consistent returns obtained on this farm for several years past might well be regarded as the beginning of a new chapter in local lucerne history. Some account of the various operations and the reasons therefor may indicate lines on which the crop may be grown with profit by settlers. When one recalls the nature of the lucerne plant—its wonderful capacity for throwing up one rapid growth after another—the excellent quality of the fodder—the profits that undoubtedly attach to a good stand well handled—one cannot but feel that with a combination of favourable temperature and sunshine and of assured water supply, lucerne should have a larger place in the farming of the district. In parts the soil certainly presents serious problems—almost difficulties—but the opinion may be hazarded that the number of past failures due to errors in methods of irrigation and management have been almost as great as those due to unfavourable soil and subsoil conditions—perhaps greater.

Yanco as a Lucerne District.

A brief comparison of the position of the producer of lucerne hay in a district like Tamworth with a Yanco or Mirrool grower suggests that the latter is not by any means in a bad position. On the Peel River a common rental for a first-class lucerne farm is £5 to £6 per acre per annum, while at Yanco the best of the land costs only 25s. per acre per annum, including the water rates. The Tamworth man is subject, too, to the vicissitudes of the season, to spells of dry weather, to floods, to visits of caterpillars, and to the depreciation of a couple of cuts per season by bleaching. The Yanco settler, on the other hand, is independent of the season, for his water supply is assured; he can flood his land and drown out the caterpillars if they come along, and he should be able to produce perfect hay from almost every cut. The irrigation farmer has thus all the climatic advantages, and when it is reckoned that he has a much cheaper rent to set against the extra 60 miles of rail to Sydney market and the labour of turning on and watching the water, it seems reasonable to expect the Yanco grower some day to become more numerous and more opulent.

Soil Conditions on the Farm.

The soil on Yanco Experiment Farm is less adapted to lucerne than a good deal of land on the area, though, on the other hand, it is better than patches. It consists for the greater part of a heavy clay loam, the top soil varying from 5 to 8 inches in depth and being underlaid by a band of clay that varies from 2 inches to 22 inches in thickness. The variation in the clay subsoil is generally the reverse of that of the top soil, so that where the top soil is only 5 inches deep the clay band is generally at its thickest, while the deeper top soil is usually associated with the minimum of clay. That the lucerne will do best where the top soil is deepest is fairly obvious; where the clay subsoil is deepest the growth is not so luxuriant, although the stalk is finer and the hay therefore of better quality.

From Standing Crop to Railway Truck in Four Days.
Lucerne Haymaking with Modern Machinery.

When to Sow Lucerne.

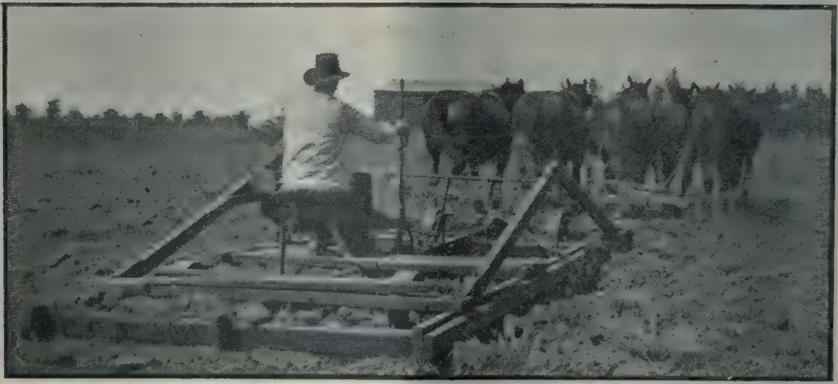
Under such conditions care is essential in order to ensure the establishment of a good stand, and the first thing to take into account is the time when the seed should be sown. It might be said in one word—autumn. The soil is then warm, it is possible to apply the water in such a way as to ensure a saturated subsoil, and to work the surface so as to produce an almost ideal seed-bed, and the lucerne can be got above ground sufficiently before winter to enable it to continue slowly to establish itself during the cool months, so that in the spring it is ready to respond to the increasing temperatures and to such applications of water as the weather makes necessary.

Spring sowing is quite possible, but the plant is more delicate and requires more attention, greater care, and extra labour to ensure a profitable stand. It necessarily feels the effects of the advance of summer more, not being so well established as the autumn-sown plant, and it will yield at least one cut less in the first season than a stand sown five or six months earlier. On this farm it is common now to sow blocks of 30 acres in the autumn and to do so with reasonable assurance of a good stand, but of spring sowing the area would not exceed 5 acres. The methods adopted in spring sowing are, in essence, quite the same as for autumn sowing, the only differences being those obviously imposed by the season. For convenience, the method described in this article is that adopted for the autumn.

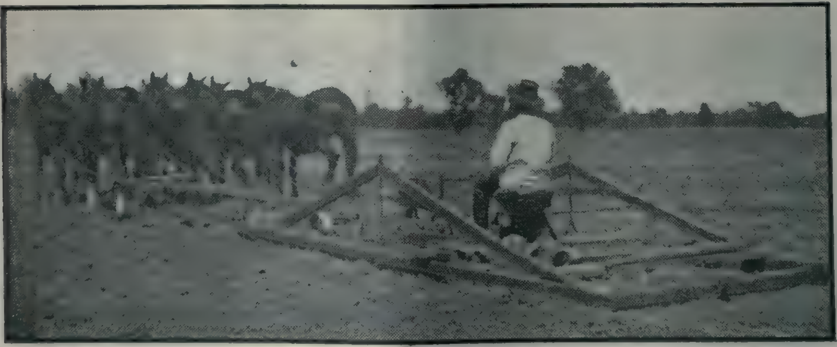
Preparing the Land for Lucerne.
A wheat or oats crop for hay is a useful precedent to the legume.

Preparing the Ground.

It will perhaps be appropriate to remark at the outset that as the unhindered flow of irrigation water across the field has at all times to be kept in view, it is essential that all operations shall be conducted in the direction of the fall. The ploughing must be in small lands and not round and round. or it will be found that dips will remain in the centre in which water will lie and will kill out the lucerne; on one occasion such a mistake was made on the farm some years ago and the stand suffered accordingly. Similarly. the ploughing must not be across the fall. or the inequalities of the ground will interfere with the flow of the water. Cultivation (except of the very lightest character) must be in the same direction for the same reason. The seed drill must work the same way or the rows of the lucerne, crossing the fall of the water, will impede its advance and produce uneven watering with possibly the killing out of certain patches. The surface cultivation to which the crops are annually treated after they are two or three seasons old must be guided by the same principle. In a word—all work likely to affect the levels, even a little, must be the one way.



Louvred Smoother or Grader. Used to produce an even surface.



Side View of the Louvred Grader.

The first ploughing is usually given in December or January. It is generally found a good practice to precede the sowing of lucerne with a cereal crop. The working tends to produce a good tilth and also enables the character of the soil to be known accurately. As soon as the crop is off, the stubble land is ploughed 6 or 7 inches deep, the disc plough being used, though there is no reason why a mouldboard implement should not do quite as well. A short fallow of two or three months is allowed before a louvred grader or smoother is put over the land, across the plough, to produce an even surface.

(To be continued.)

Harvest Report.

NYNGAN EXPERIMENT FARM.

S. RUDKIN, Manager.

THE 1920 planting at Nyngan Experiment Farm consisted of 305 acres of wheat and oats on fallowed land (inclusive of experiments), and 140 acres on stubble from wheat that had been fed off. The first-mentioned area was intended for use as the main crop, and the latter for feeding off. The fallowed area was made up as follows :—Commercial area : Paddock No. 7, 100 acres ; Paddock No. 18, 140 acres. Experimental area : Paddock No. 4, 35 acres ; Paddock No. 1B, 30 acres. The unfallowed area comprised Paddock 19, 140 acres.

The Season.

The rainfall was exceptionally good, as will be seen from the following figures :—During period of fallow : 727 points. Growing period : June, 436 points ; July, 180 points ; August, 83 points ; September, 345 points ; October, 240 points ; total, 1,284. No hot westerly winds were experienced, consequently the grain filled well and high yields were the rule, much higher than in any previous year at Nyngan. A yield of 30 bushels per acre must be regarded as phenomenal.

As was to be expected, the fallows were clean at planting, and with no rain before the heavy June fall germination was good. The bulk of the hay was stacked with little rain on it, but owing to the rapid ripening some was cut rather on the late side. The grain was well filled, Sunset, Firbank, and Canberra being very good samples for Nyngan.

Paddock No. 7, *Block* 1.—Previously cropped with wheat, 1916 ; ploughed with disc 5 inches, July, 1919 ; cultivated with spring-tooth crossways from ploughing, January, 1920, and again with disc-cultivator in February ; spring-toothed just prior to planting. Hard Federation was sown with the disc-drill at the rate of 30 lb. seed and 30 lb. superphosphate per acre. The germination and the resultant crop were good.

10¾	acres gave a return of	130 tons of silage.
35¼	,, ,, ,,	102 ,, hay.

Paddock No. 7, *Block* 2.—Ploughed with mould-board 5 inches, 1st July, 1919 ; spring-toothed in January, 1920 ; disced in February ; disc again used before planting, followed by roller and harrows. The hoe drill was used, with Hard Federation again the variety, and seed and superphosphate at the same rate as on Block 1. The germination and the resultant crop were again good. Harrows were used when the crop was about 6 inches high, across the drilling.

8¼	acres gave a return of	18 tons of hay.
45¾	,, ,, ,,	503 bags (1,509 bushels) grain.

Paddock No. 18.—Previous crops, rape (failure), and wheat (fed-off); this paddock had not had a successful wheat crop before. It was ploughed in September, 1919, half with disc and half with mould-board; spring-toothed across the ploughing in January, 1920, and again in April with the disc, followed by harrows before the drill. Both the disc and hoe drills were used in planting 132 acres of Hard Federation, 5·17 acres of Sunset, and 2·83 acres of Sunrise oats. Germination was good, except at the southern end of the paddock, which received a local thundershower which partly malted some of the seed. Twenty-two and a half acres of Hard Federation was cut for hay, while the remainder was stripped with the header. The Sunset was stripped on the late side, and the Sunrise oats were cut with the binder. The bulk of the wheat in this paddock was bleached, but well filled.

22½ acres Hard Federation gave a return of 55 tons hay.
109½ „ „ „ „ „ 1,110 bags (3,330 bus.) grain.
5·17 „ Sunset „ „ 28 „ (84 „) „
2·83 „ Sunrise oats „ „ 5 tons hay.

Paddock No. 19.—Wheat after wheat (fed-off); stubble disc-cultivated just prior to the drill, followed by harrows; the seed-bed had sufficient loose earth to cover the seed; both the disc and hoe drills were used. Germination was the same as in paddock No. 18, which was adjacent. This crop was intended as a rotation crop to be fed off, but the season was so favourable that this was well-nigh impossible with the number of sheep on the farm. The crop from 17·36 acres was ensiled, and the remainder cut for hay. Both these operations were let by contract, as our hands were fully occupied on other areas. About 40 acres of the hay was well advanced.

17·36 acres gave a return of 170 tons silage.
123½ „ „ „ 278 „ hay.

It is intended to hold the bulk of the fodder as a reserve for years of scanty rainfall.

SUMMARY of Yields.

Paddock.	Acres.	Variety of crop.	Total yield.			Yield per acre.		
			Silage.	Hay.	Grain.	Silage.	Hay.	Grain.
			tons.	tons.	bus.	tons.	tons.	bus.
7	10¾	Hard Federation ..	130	...	...	12·9	..	...
7	35¼	,, ..	...	162	...	...	2·9	...
7	8¼	,, ...	...	18	...	...	2·2	...
7	45¾	,, ...	...	...	1,509	...	..	33·0
18	22½	,, ...	...	55	...	. .	2·4	...
18	109½	,, ...	...	...	3,330	...	...	30·0
18	5·17	Sunset	...	...	4	...	...	16·2
18	2·83	Sunrise oats ...	...	5	...	...	1·8	...
19	17·36	Hard Federation ...	170	...	..	9·6	...	...
19	123½	,, ..	...	278	...	...	2·25	...

Farmers' Experiment Plots.

GRAIN TRIALS, 1920.

On and Adjacent to Murrumbidgee Irrigation Areas.

A. N. SHEPHERD, Assistant Inspector of Agriculture.

DURING the past season the undermentioned farmers co-operated with the Department in the trial of varieties of wheat and oats for grain:—

J. Leitch, "Glenlee," *via* Leeton.
J. N. Johnson, "Ballyearlie," Colinroobie, *via* Narrandera.
H. Booth, Farm 854, Whitton.
G. John and Son, Farm 194, Griffith.

The first two experimenters have farms situated on the dry lands adjacent to the irrigation areas, in the centre of a fairly large wheat area. On similar lands wheat has been grown more or less successfully for a number of years, and when good fallowing operations are adopted, payable crops are obtained. In such seasons as that just experienced, heavy yields have been harvested.

On both farms on the irrigation area the land sown was irrigable, but owing to the exceptionally good rainfall it was not found necessary to irrigate.

Rainfall registrations made at Leeton were as follows:—May, 31 points; June, 213 points; July, 276 points; August, 261 points; September, 286 points; October, 166 points; November, 153 points. Those recorded at Mr. Leitch's farm were:—May, 18 points; June, 244 points; July, 252 points; August, 228 points; September, 235 points; October, 305 points; November, 81 points; and on 5th December, 136 points. The last fall was of practically no use to the crop, as at that stage the early wheats had matured, and the others almost so.

"Glenlee," via Leeton.—This land consists of a red sandy loam. Wheat had been sown the previous year, but was a failure owing to the dry season. The land was then worked as if it had been a bare fallow. Both variety and manurial trials with different quantities of superphosphate were conducted. The seed was sown on 13th May, 1920, at the rate of 45 lb. per acre, and in the variety trial superphosphate at the rate of 45 lb. per acre was used. The land at sowing time was rather dry, but otherwise in good order. A shower of rain in May germinated the seed, but was barely sufficient to keep the young plants going until the break in the weather in June. Nevertheless, after these later rains the crop made rapid growth.

From the start the plot of Hard Federation fertilised with ½ cwt. of superphosphate showed most promise. It will be noticed that Zealand gave the heaviest yields, followed very closely by Yandilla King. Canberra, practically a new variety in the district, appears very promising. It was grown by other farmers this season, and in many instances gave larger returns than Federation.

In the manure trial it was very noticeable that the land most heavily fertilised gave the lightest returns. This is hard to account for in such a season as that just experienced, when there was such an abundance of moisture, and when one would have expected an extra heavy yield. The crop appeared very good—not merely an overgrowth of straw—but as soon as the machine was put into the crop, it could be seen the return was going to be light. Many of the ears did not fill well.

"*Ballyearlie,*" *Colinroobie.*—A variety trial with wheat and oats, and a manurial trial with the former, were conducted on this farm. The land was typical of the wheat areas in the district, being a red sandy loam. The experiment was sown on land that had been a failure last season, and which, after being grazed off with sheep, was worked as an ordinary fallow. Similar rates of seeding and fertilising were adopted, oats being sown at the rate of 45 lb. per acre in the variety trial. In the manurial test two different rates of fertilising with superphosphate were used, with an unmanured plot as a check. In the variety trial, Hard Federation gave the best return, and Canberra proved next best. Two varieties of oats were used, Algerian and Sunrise, and both gave good payable crops.

Farm 854.—A variety and a manurial trial were conducted on red clay loam. When this crop was sown it was intended to utilise it as a hay crop, but owing to the rank growth it was fed off, and then allowed to mature a grain crop. The seed was sown on 23rd April at the rate of 1 bushel per acre, and superphosphate at 56 lb. per acre was added.

The following mixtures were used in the fertiliser trial :—P7 (equal quantities of superphosphate and bonedust) ; P8 (equal quantities of superphosphate and blood and bone); M5 (2 parts superphosphate and 1 part sulphate of ammonia). Whilst superphosphate was used as a check, very little variation in yield was discovered in this experiment. Firbank gave the heaviest return in the variety trial, and Hard Federation the lowest. The low yields of the latter variety can be accounted for by part of the plot being spoiled by water lodging and the crop scalding. Otherwise this plot would have given the best yield.

Farm 194.—These plots were sown on new land, red clay loam ; ploughed in May, well worked down, and seeded on 5th June, 1920 ; wheat at the rate of 1 bushel and superphosphate ½ cwt. per acre.

This plot was sown just before the drought broke, and derived full benefit from the good rainfall that followed. Some of the plots showed rust ; this was especially noticeable with Bunyip. It is extremely doubtful if this variety should be grown on the area, for even in a normal season when irrigation is practised it is certain this wheat would be badly affected with rust.

Hard Federation gave the heaviest yield, being heavier than the next (Bomen) by over 7 bushels. Bomen produced a very fine sample of grain.

RESULTS of Variety Trials.

Variety.	Glenlee.	Colinroobie.	Farm 854.	Farm 194.
	bus. lb.	bus. lb.	bus. lb.	bus. lb.
Zealand	34 55	......	......	......
Marshall's No. 3... ...	34 30	......	27 33	......
Penny	32 24	24 0	......	......
Canberra	30 0	26 30	28 27	23 10
Currawa	29 15	26 0	......	......
Florence	28 0	25 0	......	......
Federation (graded) ..	28 0	27 30	......	......
Yandilla King	26 15	......	......	24 58
Federation (ungraded) ..	24 25	......	......	......
Bomen	......	26 0	......	25 2
Gresley	......	25 45	......	......
Firbank	......	......	29 3	......
Hard Federation... ...	......	......	27 24	32 58
Bunyip	......	......	......	15 48

RESULTS of Fertliser Trials.

		bus. lb.
Glenlee	½ cwt. Superphosphate ...	32 24
	42 lb. ,, ...	30 54
	30 lb. ,, ...	30 18
	No manure	20 26
	75 lb. Superphosphate ..	17 42
Colinroobie ...	45 lb. Superphosphate ...	27 10
	30 lb. ,, ...	26 0
	No manure	20 30
Farm 854 ...	½ cwt. P7	26 48
	½ cwt. P8	26 25
	½ cwt. Superphosphate ...	26 12
	½ cwt. M5	25 30

The variety used in the first two cases was Hard Federation, and that in the last Yandilla King.

MR. R. F. MITCHELL, "Glen Gyle," Delungra, writes thus concerning the possibilities of Milo grain sorghum:—"I obtained seed, and the results have been surprising. I got a splendid crop, but, owing to the peculiar season, my header-harvester was engaged saving my neighbours' crops, with the result that my Milo was much knocked about by storms, though I did half an acre with the header, and obtained four bags of seed. I consider Milo has a great future in that part of Australia where wheat is grown and where there is a certain amount of summer rain, as, in such districts, the farmer will have the machinery to take it off, and he will get a crop of Milo when he will get no maize."

FOUR NEWLY RECORDED WEEDS.

AT a meeting of the Linnean Society of New South Wales on 27th April, Mr. W. F. Blakely exhibited, from the National Herbarium, four weeds not hitherto recorded for the State.

Calandrinia caulescens H.B. et K. var. *Menziesii* Gray, a native of California and British Columbia, from Tipperary, near Young (R. Nixon, Sept., 1913), Hawkesbury Agricultural College, "Introduced with American hay" (C. T. Musson, Oct, 1917), Deniliquin (W. C. Wentworth, Oct., 1920), and Canoblas. "It produces small shiny black seeds in such quantity as to cover the ground under the plants. Stock eat it and at the stage when it is well ripe they seem to eat up the seeds as well" (W. C. Clark, Oct., 1920).

Sisymbrium altissimum L., "Tumbling Mustard;" a tall, twiggy plant, belonging to Cruciferae, from Cudal. When mature, the stems break off near the surface of the ground, and the plants are tumbled about by the wind, hence the vernacular name. The first botanical record of this plant is from the northern shores of the Mediterranean Sea, but it is now common throughout Europe, Northern Africa, Western Asia, the United States of America and Canada. In these countries it is a very troublesome agricultural weed, and every effort is being made to eradicate it.

Orthocarpus purpurascens, Benth., and *O. erianthus*, Benth., family Scrophulariaceae. Both plants are indigenous to California. They were first brought under notice by Mr. C. T. Musson, of the Hawkesbury Agricultural College, in 1916, having come up in the vicinity where stock had been fed on American hay. The former had been collected from the same locality by Mr. W. M. Carne this year, and also from Trangie Experiment Farm (C. A. Linden).—J. H. MAIDEN.

WINTER SCHOOLS FOR FARMERS, 1921.

ARRANGEMENTS have been made for the annual Winter School for Farmers to be held at Hawkesbury Agricultural College from 21st June to 15th July. The syllabus covers a comprehensive course of lectures and demonstrations on agriculture, horticulture, live stock, &c., and in addition, practical training is available in useful work connected with farm life, such as saddlery, engineering, blacksmithing, carpentry, &c.

To meet a popular demand, a special school will be held for those who desire to specialise in the subject of poultry-farming. All branches of the industry will be fully dealt with, and, moreover, the students will be given an opportunity of studying such subjects in the general course as are likely to be of value to them.

Farmers, or their sons over 16 years of age, who have been engaged in rural work for at least one year, will be eligible for admission to the general course, and admission to the poultry course will be granted to persons of either sex over the age named who are engaged in poultry-farming.

The fee for either course, inclusive of board and lodging, will be £5. Prospectus and full information may be obtained on application to the Under-Secretary and Director, Department of Agriculture, Sydney.

The Cause of Black Disease and its Method of Transmission.*

BEING FURTHER STUDIES IN A BRAXY-LIKE DISEASE OF SHEEP.

SYDNEY DODD, D.V.Sc., F.R.C.V.S., Lecturer in Veterinary Pathology and Bacteriology, Veterinary School, The University of Sydney.

In a previous article on black disease in sheep in New South Wales, the writer described the history, symptoms, &c., of this condition, and detailed investigations he had carried out regarding its cause. During this research no positive results such as would justify a careful worker in drawing any definite conclusions, were arrived at, and no definite opinion was expressed as to the cause, although three possible causal factors were discussed, viz., bacterial, nutritional, and plant poisoning. Reasons were given for rejecting the two latter hypotheses. The probable bacterial origin was discussed, and it was stated that the morbid anatomy of the disease indicated a toxaemia, although at that period no bacteria to account for the condition had been demonstrated with sufficient constancy in the tissues, &c., of animals dead from the disease, provided the precaution had been taken to remove such materials immediately after death to reduce the probabilities of agonal invasion to a minimum, and to completely avoid post-mortem invasion. It was also suggested that it was quite possible that the cause was bacteria which were confined to lesions somewhere, or to the intestines, where a toxin was elaborated. Furthermore, it was demonstrated that when exudates, heart blood, portions of organs, &c., taken at random, were removed immediately after death, no bacteria, with certain exceptions, could be cultivated from them.

In the earlier studies, mentioned above, a description of the post-mortem appearance of sheep dead of black disease was given, but this was compiled from autopsies made on animals, many of which had been dead an unknown although short period. It is thought desirable to record here the appearance of black disease sheep in which secondary changes have not had time to occur. The following is compiled from post-mortem examinations made on over a hundred such cases that have been seen to die, or have been killed, the examination being conducted at once.

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* The present article has been written some considerable time, but owing to various circumstances a full description of the cultural and other characteristics of the causal organism has not yet been completed. Some of the former are described herein, but these relate mainly to growth in liquid media. It is fully realised that in view of the recent advance in our knowledge of the biology of the anaerobes, no description of an anaerobic organism can be considered complete unless the cultures are started from a single colony, in order to avoid the possibility that one may be dealing with mixed cultures. The writer had determined to withhold publication until this had been done, but circumstances have arisen which render it desirable that the results of six years' research in black disease be made known without any further delay. A complete description of the cultural characteristics of the causal organism, and some notes on serum reactions, &c., can be furnished subsequently. The present article also appears in the *Journal of Comparative Pathology and Therapeutics.*

The carcase is usually in good condition; and although fluke disease is very prevalent in the black disease localities, I have not seen an animal in the advanced stages of fluke infestation, affected with black disease. This is also the common opinion of sheepowners. The subcutaneous vessels are usually engorged, but not invariably so. No muscular lesions have been seen.

Either the thoracic or the abdominal cavities contain a varying amount of straw-coloured, odourless exudate, usually rather turbid in the case of the latter. A similar clear exudate may at times be found infiltrating the intermuscular tissues of the floor of the abdomen and, rarely, the perirenal tissues also. There are no distinct changes in the lungs. Almost invariably the pericardium is distended with a clear, straw-coloured exudate which soon coagulates on standing. If the examination has been delayed, these exudates may be found more or less blood-stained. The heart frequently shows hæmorrhages in the endocardium of the left ventricle, and at times on the epicardium also. These endocardial hæmorrhages may in some cases, however, be agonal in origin.

The liver, kidneys and spleen are congested, but there is no pronounced swelling of the latter. All the livers examined have shown evidence of recent fluke invasion. This organ almost invariably presents one or more necrotic foci, greyish or dirty yellowish-white in colour, firm, and odourless, varying from $\frac{1}{4}$ to 2 inches in diameter, usually circular but occasionally elongated. The edges are irregular, but sharply circumscribed. These foci may be situated anywhere in the liver substance, often superficial, but at times deeply placed and then only free incision will reveal them. Not infrequently, rather circular, hæmorrhagic areas up to an inch in diameter may be met with in the liver also. The abdominal and thoracic lymphatic glands are congested and moderately swollen. The mucosa of the abomasum is frequently congested, often in patches. In the latter case, it is usually most conspicuous around the pylorus. Small hæmorrhages may be scattered over the surface of the organ. At times (but this is by no means common) circular, superficial ulcers may be seen on the mucous membrane of the abomasum. It is probable that these ulcers when they occur are really peptic and of a secondary character. Certain areas of the mucosa are more severely damaged by the bacterial toxin or by hæmorrhage and the digestive action of the gastric juices acting on this locally injured spot leads to a loss of substance, an ulcer resulting.

The small intestines are more or less deeply congested. Occasionally they are hæmorrhagic, the congestion being most pronounced in the duodenum. At times this is the only part of the bowel affected. The large intestine is normal. Not infrequently the omentum may present numerous small hæmorrhages scattered throughout its substance. The urinary bladder and urine appear normal.

It must be borne in mind that the foregoing represents the appearances at the time of death. If only a few hours have elapsed between death and the holding of the post-mortem examination, various changes often take place which will present quite a different picture. These have been confounded with the lesions of black disease (just as is the case with the published descriptions of the lesions of braxy in Great Britain) but must be viewed as being of purely post-mortem origin.

With the knowledge gained from the previous researches, investigations were continued during 1917, 1918, and 1919, in the field and the laboratory. It was evident that if the cause was bacterial and capable of being transmitted artificially, it was not resident in any of the materials just mentioned. The nature of some of the experiments showed that it was not a filter passer. The question then, after reviewing the subject and assuming that the cause was bacterial, resolved itself into one of two possibilities, viz. :—

(1) The causal organism was confined to the lesions, whatever these might be.

(2) It was confined solely to the alimentary tract.

Experimental work eliminated the second possibility, since the feeding to a number of sheep of minced up intestines, stomach, &c., produced no positive results, and the ascertained facts in connection with natural black disease did not support the view that infection might be due to minute injuries to the mucous membrane of the intestines. The problem was thus narrowed down to the question as to whether the causal organism, if any, was only to be found in the lesions. As before mentioned, the examination of animals before post-mortem changes had time to set in enabled one to determine which were black disease lesions and which were not. Now, although bacteria could readily be detected in the congested mucosa and submucosa of the abomasum and small intestines when a little time had been allowed to elapse between death and the removal of the tissues, these areas were found upon microscopic examination to be bacteria-free if such tissues were removed and placed in a fixative solution immediately after death. The same could be said of all the lesions in the various parts of the body, with the exception of those portions of liver containing necrotic foci. It was very evident, therefore, that if the bacteria present in such situations, with the exception of the last mentioned, were the cause of death, they must primarily have grown elsewhere, and that the submucosa of the stomach and intestines, the kidneys, blood, &c., had only been invaded during or subsequent to the death agony. Attention was, therefore, more and more focussed upon the necrotic areas in the liver. It will be seen on reference to my previous article, that even when these parts were removed directly death had occurred, there was histological evidence of an inflammatory reaction, and that the necrotic foci contained numbers of bacteria. The opinion was, however, expressed at the time that these bacteria were probably secondary invaders, since certain hæmorrhagic areas occasionally encountered in the same organ appeared under the microscope to be bacteria-free. At that period it was thought that these hæmorrhagic foci were the precursors of the necrotic areas. Accumulated knowledge has led me to change that opinion, and to now consider that the latter are not secondary to the former, and that the hæmorrhagic foci may even be due to an entirely independent cause.

To follow the reasoning in connection with the cause of black disease, it is desirable to describe more fully than previously the hepatic necrotic areas met with in this condition. One or several of these lesions may be present. Not infrequently they may show no surface indications of their existence, their presence only being demonstrated by free incision. In view of this, it is quite possible that in the early days of the investigations where no necrotic lesions were recorded, such may have been present but escaped detection because not specifically looked for. It should be mentioned, however, that on two occasions where the animal showed clinical and post-mortem signs of black disease (with the exception of these liver lesions) no necrotic areas could be detected after search. This feature will be referred to later and a possible explanation suggested.

The naked eye characters of the necrotic areas have already been described.

Histology of the Necrotic Liver Focus.

Sections show the lesion to present the appearance of coagulative necrosis. It is surrounded by a broad zone of leucocytes, which sharply delimits the normal from the necrotic portions. Immediately within the leucocytic zone are bacilli, often in thick felted masses, arranged around the whole circumference of the lesion. Many of these bacilli are of sufficient length to approach that of the filamentous. Scattered among them are single vegetative elements, but there are no long chains of many individual rods. Occasionally a sporing bacillus with a terminal or subterminal spore may be seen. The bacillary rods are thick, and have rounded ends. If death has elapsed a little before the removal of the affected portion of the liver, numerous bacilli will be found sporing. Scattered throughout the whole of the necrotic area are bacilli having the same morphology—sometimes numerous, at other times scanty. They are, however, usually single, and toward the centre of the lesion filamentous forms are rare. Here and there rounded coccus-like organisms may be seen, but these are merely the bacilli standing on end in the section. The organisms are usually present in the lesions in a state of purity, and they are strictly confined thereto up to the time of death, for although numerous sections from the livers of various affected sheep have been examined, no bacilli could be detected microscopically in the liver tissue outside the leucocytic zone surrounding the area of necrosis, not even in the hæmorrhagic foci, which are occasionally encountered in the same liver. This absence of bacilli from all places except the area of necrosis does not include those very infrequent occasions in which the animal has died from clinical black disease, but there has been no naked eye evidence of focal necrosis in the liver. Yet bacilli having the characters of black disease bacilli have been isolated from that organ. It will be seen later that it is considered that these cases are ones of mass infection, the animal dying before a gross lesion has had time to develop.

It is quite probable that invasion of the surrounding liver tissue from a necrotic focus and thence of the blood vessels, in conjunction with bacteria from the intestines may take place very soon after death. The histology of the lesion and the disposition of the bacilli recall that of bacterial necrosis of the liver, much more common in cattle, however, than in sheep, due to the necrosis bacillus, although the morphology of the two organisms differs very considerably. In my former article, in order to guard against arriving at conclusions without sufficient evidence, it was stated that the mere presence of organisms in a lesion is not in itself sufficient to prove that those particular organisms are the cause of death of the animal in which they may be found, or that they are the cause of the disease under investigation. When, however, in animals affected with a particular disease, certain lesions are of very common if not invariable occurrence in an organ, and when in such lesions there are constantly found bacilli apparently in pure culture, further investigations are indicated as to the rôle they play. When portions of an organ containing such lesions are removed immediately after death in an aseptic manner, and placed at once in a fixative solution, the probability of *post-mortem* invasion of such tissues by bacteria is negligible. Furthermore, in addition to the necrotic lesions containing the particular organism in large numbers, there is also distinct evidence of reaction on the part of the tissues to the bacterial invasion, and the bacilli in the cases just mentioned, as far as has been ascertained, are confined to these necrotic foci.

All the foregoing factors enumerated, taken collectively, should afford satisfactory evidence that the bacteria in question were present in the situations where they have been demonstrated, some time before death occurred. They, therefore, are clearly not agonal invaders.

The question to be decided is whether the rôle they play in black disease is the primary, or only a secondary one? In my former article, I remarked that they were apparently secondary invaders, because they were absent from the hæmorrhagic hepatic foci which one occasionally met with, and because inoculation experiments on a guinea-pig and a rabbit were negative. It was at that time thought by the writer that these hæmorrhagic areas were the precursors of the necrotic lesions. This, as before remarked, I now consider in all probability to be an error; the former may have quite an independent origin, *e.g.*, early acute fluke infestation, or perhaps they are due to the toxin produced by the causal bacteria. For the failure to infect a rabbit and a guinea-pig with cultures of organisms isolated from a necrotic liver focus in Case 14, described in the before mentioned article, several explanations present themselves; *e.g.*, the bacillus may have become attenuated by various means during the laboratory manipulation, especially by cultivation in glucose media, not much particular attention being paid to the preservation of virulence, as the organism at that time was thought to be a secondary invader, and with such attenuated organisms the dose administered was too small. That the bacilli do become attenuated in this manner has been demonstrated, even when fresh sub-cultures are employed for inoculation. More detailed experimental work showed pretty conclusively that the bacillus in question could not be regarded merely as a harmless secondary invader of tissues already damaged, for such work demonstrated that small amounts of virulent cultures of the organism are capable of bringing about a speedily fatal result upon par-enteral inoculation, and that the lesions thus artificially produced by it in the sheep are anatomically those of black disease.

It remains to be stated that the foregoing views are not hasty conclusions based upon insufficient evidence, but are the outcome of the examination of, and experimental work with, tissues from a large number of sheep dead of black disease, and as controls, sheep naturally affected with various other conditions.

(To be continued.)

TREATMENT OF HOVEN IN COWS.

BLOAT, or hoven, is due to succulent foods eaten under certain conditions, which cause the formation of large quantities of gas in the rumen or paunch, and in consequence a swelling of the left flank. It is most often seen (*a*) when cattle are turned hungry on to such succulent green food as lucerne, clover, &c.; (*b*) when cattle used to dry feed are suddenly changed on to green, soft food; (*c*) when travelling cattle are allowed access to large amounts of green food, such as variegated thistle; (*d*) when cattle gorge themselves on wet grasses or herbage; and (*e*) when cattle are fed on roots or potatoes under certain conditions. Some animals appear to be more subject to hoven than others.

Keeping the mouth open with a gag, or a piece of wood, until the beast has belched most of the gas by mouth will be useful in mild cases. The internal administration of 1 oz. of bicarbonate of soda, and 1 oz. of ginger, is sometimes useful, and it may be repeated in a few hours—if necessary. In a bad case the most effective treatment is the puncture of the paunch. This is done on the left side in the flank—at a point equidistant from the last rib—the edge of the loin bones, and the angle of the haunch. The correct instrument for this purpose is trocar and cannula. The cannula is a tube through which passes a sharp-pointed instrument—the trocar. This instrument is thrust into the rumen, and the trocar is withdrawn, leaving the cannula in place, and through this the gas escapes. In case of emergency a knife may be used in the same way, the gas escaping through the cut, but complications may set in and cause death if this is not done expertly. After the gas has escaped the animal might be given a dose of linseed oil (1½ pints), and turpentine (1 tablespoonful). This mixture should be well shaken up while being given.

Every effort should be made to prevent the occurrence of hoven in stock. In feeding lucerne and clover, if the animals are not used to it, they should be put on it gradually until they become accustomed to it. If lucerne is fed in a wet state, or after heavy rain—when it is soft and juicy—it will almost always produce trouble; and cattle should, therefore, be kept off it until it is drier.—VETERINARY OFFICERS of the Stock Branch.

CORRECTION.

IN the "List of Fertilisers," published in the April number of the *Agricultural Gazette*, owing to an error in the calculation, the manurial value of No. 7 Complete Fertiliser (Wooster Fertilisers, Limited) on page 281, is wrongly given as £11 12s. 9d. per ton. The correct figure for the manurial value of this product is £12 19s.

Field Experiments with Cereals.

GLEN INNES EXPERIMENT FARM.

L. G. LITTLE, Experimentalist.

[The Experiments Supervision Committee, under whose control these experiments are being conducted, wish to draw the attention of farmers to the fact that the results given below are only those of one year's trial, and that final conclusions cannot yet be drawn.]

WHEAT VARIETY TRIALS.

THE object of the experiment was to determine the most suitable varieties of early and mid-season wheats to grow in this district.

The season was dry during the autumn, with severe cold conditions during early winter. Beginning in June, the rainfall was much above the average; indeed, seldom has such good rain fallen in June and July, and this thorough soaking, followed by a period of good rainfall and few frosts, ensured an excellent season for cereals.

The harvest period fortunately was fine and dry and enabled the gathering of the crops without damage.

The land had been used for wheat variety trials in 1918, and had been under a fodder crop (rye grass and clover) in 1919. In 1920 it was ploughed in April, harrowed in May, disc-cultivated when practicable in June, and harrowed twice prior to planting. The seed-bed at planting time was very sodden. Planting was carried out on 29th July, the seed being sown at the rate of 66 lb. per acre, and superphosphate at 50 lb.

The germination was slow and not very satisfactory.

None of the varieties stooled satisfactorily; the late planting seemingly caused the growth to be forced. The crops reached a height of 3 feet 6 inches to 4 feet. Florence was shortest and Early Haynes' Blue Stem tallest. The stand was thin throughout, the hay yields being light in comparison with oats.

All varieties except Clarendon and Early Haynes' Blue Stem were more or less affected by rust, which made its appearance in December, and pinched grain samples were the rule. Some ergot was noticed in the Genoa plots, and bunt in Glen Innes White.

Maturity was affected by the rust. Florence and Clarendon matured in the middle of December, but the other plots dried off at the end of that month whether they were matured naturally or strangled with rust.

The hay plots were cut in the middle of December, except Clarendon (cut on 1st December) and Florence (cut on 7th December). The grain plots were cut with the binder, the Clarendon and Florence plots on 29th December, and the others on 3rd January. Threshing was carried out in February.

The rainfall for the year 1920 was as follows:—January, 654 points; February, 113 points; March, 143 points; April, 186 points; May, 253 points; June, 419 points; July, 416 points; August, 254 points; September, 361 points; October, 225 points; November, 251 points; December, 349 points—total, 3,624 points on 165 days.

The rainfall during the actual growing period was 1,466 points for the hay and 1,555 points for the grain.

Notes on the Varieties.

Genoa (which was used as the standard) was rusted, and gave a pinched small sample; the hay yield was of fair quality.

Glen Innes White is a good hay variety; affected with bunt; badly rusted this season; yellowish pinched grain.

Glen Innes No. 2 is another good hay variety, with reddish grain; badly rusted.

Glen Innes No. 3 appears to be a satisfactory dual purpose wheat; rust-resistant; soft brownish, plump grain, and fair quality hay.

Florence is a good standard variety for late sowing; essentially a grain type here; a sparse stooler; yielding excellent grain usually, but slightly pinched this season; hay weighs heavily for bulk.

Clarendon is outstanding as a rust-resister, and a splendid yielder of excellent light grain; evidently suited by the late sowing; rather sparse stooler; early maturing and satisfactory for hay.

Early Haynes' Blue Stem is another outstanding rust-resister. It produced an excellent hay sample, being the tallest of the varieties. It is proposed to discontinue trials with Glen Innes White, Glen Innes No. 2, Wagga No. 31, and Cowra No. 3, their yielding capacity having been amply tested.

The following are the yields of the different varieties:—

YIELDS of Hay.

Variety in order of merit.	Yield per acre based on percentage.			Increase or decrease.	
	t.	c.	q.	c.	q.
Early Haynes' Blue Stem	2	17	0	17	2
Glen Innes White	2	14	0	14	2
Glen Innes No. 2	2	13	3	14	1
Clarendon	2	6	3	7	1
Glen Innes No. 3	2	5	0	5	2
Genoa	1	19	2	......	
Cowra No. 3	1	17	1	2	1
Wagga No. 31	1	15	2	4	0
Florence	1	12	0	7	2

Genoa was used as the check variety and the other varieties are compared with the average yield of that variety.

YIELDS of Grain.

Variety in order of merit.	Yield per acre, based on percentage.		Increase or decrease.	
	bus.	lb.	bus.	lb.
Clarendon	30	36	12	36
Early Haynes' Blue Stem... ...	29	38	11	38
Glen Innes No. 3	24	11	6	11
Florence	23	12	5	12
Wagga No. 31	18	0	......	
Genoa	18	0	......	
Glen Innes White	16	48	1	12
Glen Innes No. 2	14	24	3	36
Cowra No. 3	11	47	6	13

Genoa was used as the check variety, and the other varieties are compared with the average yield of that variety.

VARIETY TRIALS OF LATE SOWN WHEATS.

The object was to test a number of imported late maturing wheats with each other and with standard varieties when sown late in the season.

The season and the previous treatment of the land are mentioned above.

The plots were sown on 20th August, the seed-bed being sodden and wet, and there was difficulty in getting the seed covered. The seed was sown at the rate of 88 lb. per acre for Red Fife and 78 lb. for all other varieties. The Red Fife seed had been damaged by weevils. Superphosphate was used on all plots at 70 lb. per acre. The germination was satisfactory though slow.

In the early stages, growth was characteristically slow, stooling being on a much better scale than in the trials reported above. A remarkable feature is that these late wheats (except the varieties proved to be definite failures), made much better growth than the early maturing varieties sown a month earlier and in season. The growth was not tall, and varied considerably according to variety. The yields were influenced by the rust-resisting capacity of the varieties, and in the case of the very late varieties were closely associated with that factor. The behaviour of College Hunter, Kharkov, Kanred, Red Rock and Fultz varieties was interesting. At the time when Cleveland was harvested these varieties were still grass-like; yet within a month the rust-resisters had run up and matured, whilst the rust-liable ones had bleached off.

The trial was a severe test as to rust-resisting qualities. Rust was bad from the middle of December. Ergot was found in Cleveland and all the very late varieties, particularly Kanred. This disease seems to attack many varieties of cereals and grasses after January, and is seldom found in anything cut before then. The maturity was widely varied.

The whole of each plot was harvested with the binder for grain. The check plots, Red Fife, Haynes' Blue Stem, Marquis, and Huron, were all cut on 11th January, and the remaining plots on 21st February.

No yields were taken, but an estimate was made of the suitability and production of the varieties in this respect.

Cleveland was certainly best, being clean and rust free, and would probably have out-yielded Genoa in the trial reported above by a ton to the acre. Haynes' Blue Stem and Marquis were lighter, rusty and of poorer quality. The same may be said of Huron, which, however, is bearded. Red Fife was slightly rusted. Kandred and Kharkov were short, rust free, and bearded.

The rainfall for 1920 has already been given. Those varieties harvested on 11th January had a total rainfall during the growing period of 1,290 points, and those harvested on 21st February had 1,440 points.

YIELDS of Grain.

Variety.	Yield per acre based on percentage.		Decrease.	
	bus.	lb.	bus.	lb.
Cleveland	32	30	......	
Red Fife	22	30	10	0
Kanred	20	4	12	26
Huron	18	19	14	11
Marquis	17	10	15	20
Haynes' Blue Stem	16	0	16	30
Kharkov	9	30	23	0
Red Rock	2	0	30	30
Fultz	......		32	30
College Hunter	......		......	

Cleveland was used as the check variety, and the other varieties are compared with the average yield of that variety.

Notes on the Varieties.

(A). *Late.*

Cleveland gave excellent returns this season. It stooled well, making a thick stand, and reached a height of about 4 feet. It demonstrated a great rust-resisting capacity, maturing an excellent and attractive sample of plump grain. Some ergot was noted in this variety. It was ripe on 7th January.

Red Fife is not a free stooler. Coarse flag; moderate rust-resister. Matured a nice sample of red, horny grain. It was ripe on 7th January.

Huron is a bearded variety; moderately good stooler; almost equal with Cleveland; similar to Marquis, but with larger grain. Sample was pinched. It was ripe on 1st January.

Marquis is a moderately good stooler, similar to Huron, except for having a bald head. The grain is small and pinched, being medium rust-resistant. Earlier than Cleveland. Ripe on 1st January.

Haynes' Blue Stem rusted badly this year. Moderate to good stool; tall, but not good quality hay. Grain badly pinched. Ripe on 7th January.

(*B*). *Very late.*

Kanred was imported from America. Almost rust-proof; bearded. A good deal of ergot was present. Short—growing 2 feet 6 inches to 3 feet in height—with fine, willowy stems, with a tendency to lodge; ears small but numerous, owing to good stooling, and well filled with large red, plump grain. Ripe on 2nd February.

Kharkov was also imported from U.S.A. Rust resistant; growth similar to Kanred; 2 feet 6 inches in height, with fine, willowy stems, inclined to lodge; small, bearded heads; medium well filled, with slightly pinched red grain. Latest of all. Ripe on 12th February.

Red Rock is similar to the above, and also imported. Being much less rust-resistant, it failed to produce grain satisfactorily. Ergot was noted on small bearded heads. Ripe on 31st January.

Fultz (beardless), reached 18 inches high. Rust-liable, and a total failure. Only a percentage of heads cleared the sheaths. It was imported from U.S.A.

College Hunter (imported from New Zealand), was most susceptible of all varieties to rust. Only reached 12 inches, but few heads emerged from sheaths.

OAT VARIETY TRIALS.

The object of these trials was to determine the most suitable varieties of oats to grow in this district, and to test new and imported varieties on a comparative basis with standard varieties.

The land was occupied with an oat variety trial in 1919, and with a fodder crop of rye grass and clover in 1920, the latter being ploughed under. The land was ploughed in April, harrowed in May, disc-cultivated when practicable in June, and harrowed twice just prior to sowing. The seed-bed at planting time was sodden.

Planting, which had not begun when the rain set in, was carried out under conditions which did not make for good tilth. The plots were sown on 29th and 30th July, at 63 lb. of seed per acre, and superphosphate at 50 lb. The planting was a month late.

Germination was satisfactory, though very slow in the lower and colder moist parts. The oats were slower germinating than the wheats.

Being sown late, the plots did not make tall or rank growth, but were medium in height (4 feet), and very thick. Hay was cut rather later than was desirable, owing to the difficulty of drying in the wet period in December, but the heaviness of the yields is due to the extremely thick stand. The outstanding feature was the grain production. So heavy were the heads, that with just a few exceptions, the plots were generally lodged.

Very few diseases affected the oats, and of these rust was the only one to do any damage at all. Rust developed during the moist weather period in December, but only affected a few varieties.

Most varieties matured together. A hot period late in December after the previous moist cool conditions, with rust also present, caused the plots to dry off and mature.

The plots were cut for hay in the middle of December and the harvesting for grain was effected with the binder on 28th and 29th of that month, with the exception of Smyrna, which was the latest of all.

The rainfall for 1920 appears above. The oats had the advantage of 115 points after sowing in July, and 89 points of the December rainfall fell after the hay was harvested, which thus had a fall during growth of 1,466 points, as against 1,555 points for the grain.

This trial consists entirely of midseason oats of the finer leaved and fine to medium coarse-stemmed type. Such oats of the broad leaved coarse-stemmed type as have been tried have not yielded well, and have proved rather disease liable.

RETURNS from Oats Plots.

Variety in order of merit.	Yield per acre based on percentage.			Increase or decrease.	
Yields of Hay.					
	t.	c.	q.	c.	q.
Guyra	3	13	2	9	1
Smyrna	3	11	2	7	1
Lachlan	3	8	1	4	0
Algerian	3	4	1	...	
Glen Innes No. 1	3	3	2	0	3
Ruakura	2	18	3	5	2
Sunrise	2	16	3	7	2
Bathurst No. 5	2	16	0	8	1
Kherson	2	13	2	10	3
Fulghum	2	9	2	14	3
Cowra No. 25	2	8	0	16	1
Sixty Day	2	7	2	16	3
Cowra No. 22	2	5	2	18	3
Yields of Grain.					
	bus.	lb.		bus.	lb.
Smyrna	71	24		1	24
Algerian	70	0		...	
Guyra	66	0		4	0
Lachlan	63	28		6	12
Glen Innes No. 1	60	20		9	20
Cowra No. 25	59	0		11	0
Fulghum	58	30		11	10
Kherson	57	30		12	10
Bathurst No. 5	54	8		15	32
Sunrise	48	4		21	36
Ruakura	47	18		22	22
Sixty Day	41	26		28	20
Cowra No. 22	41	20		28	30

In both trials Algerian was used as the check variety, and the other varieties are compared with the average of that variety.

Notes on the Varieties.

Algerian, Guyra, Smyrna, and Lachlan headed the results on both trials, though they changed their order. They are well known and standard oats, except Smyrna, and can confidently be recommended. Smyrna is an imported oat, very similar to Algerian as regards grain, later maturing, and standing better than any other variety.

Glen Innes No. 1 is very similar to Guyra; it was selected as a variety with very small awn; a fair yielder of rather short growth.

Ruakura is a good grain yielder, usually of rather short growth, but appeared to be hit early by rust this season.

Bathurst No. 5 is a tall growing oat of the Guyra type: lodged badly.

Sunrise is tall growing, but not free stooling.

Kherson is a small yellow awnless oat. It yields consistently, but never equals our best varieties; imported.

Fulghum (an imported brown oat) is consistent, but does not approach the yielding capacity of our standard oats.

Cowra No. 25 is a tall growing, medium stooler; it was a better grain yielder than Sunrise this season.

Sixty Day is a small yellow awnless oat; imported. The yield consistently falls short of standard varieties.

Cowra No. 22 made but a poor showing this year; it appeared to be affected by rust.

ADULTERATED BLUESTONE.

A PARAGRAPH appeared recently in the press drawing attention to the fact that specimens of adulterated bluestone are occasionally on the market, and inviting farmers to send samples for analysis. This should be done in every case in which the sample is suspected. The following notes will guide the purchaser as to what is to be regarded with suspicion.

Bluestone is pure crystallised sulphate of copper, and should contain nothing else. Crystals of pure bluestone are of a deep blue colour. The most usual adulterant is sulphate of iron (copperas), the presence of which gives a greenish colour to the crystals, or lightens their colour to a paler tint.

If sulphate of iron is suspected it can be easily identified as follows:—Powder a few of the crystals and dissolve the powder in water in a glass tumbler or medicine glass or ounce measure, or any glass measure of a cylindrical shape. The powder should dissolve completely in water. Now add a little ammonia-water (the "liquor ammoniæ" of the druggist). The solution will turn a very intense deep blue. Allow this to stand for 15 to 20 minutes and pour off the liquid slowly and carefully. If any sulphate of iron is present there will be a dirty green residue in the bottom of the glass, which will turn to a reddish colour if allowed to stand. Water may be added to remove the deep blue liquid still remaining and the glass again allowed to stand for a few minutes, when the colour of the iron compound will be more distinct. If the sulphate of copper is pure there will be no residue.

If there is any reason to suspect the purity of the bluestone, forward a sample to the Department of Agriculture for analysis.—F. B. GUTHRIE.

Ergot.

W. A. BIRMINGHAM, Assistant Biologist.

THE ergot fungus (*Claviceps* sp.) attacks many grasses. The plants attacked can be identified by a sticky secretion of the heads, and by the presence of purple bodies which replace many of the seeds or grains. The sticky secretion is due to the presence in the developing grain of a stage of the fungus known as the conidial or *Sphacelia* stage. Insects are attracted to the secretion, and the early-formed spores or conidia are spread by this means. The diseased grains are found to be later replaced by the hard purple bodies known as sclerotia or ergots. The ergot is a hard, smooth, more or less curved purple body, resembling a much enlarged grain. Infection of the ovary at blooming time is followed by complete possession and consumption of the tissue of the developing grain by the fungus. After a period of rest, usually lasting to the following season, an ergot gives rise to several small outgrowths with swollen ends. Each swollen end has in it a number of minute flask-shaped cavities, and in each of these are minute sacs each containing eight spores. Eventually the spores escape, and are ready to infect the ovaries of fresh plants.

The sclerotium constitutes the ergot of pharmacy, and contains powerful alkaloids which bring about contraction of the uterus, paralysis and gangrene. Observations and exact counts initiated by Dr. S. R. Jones* show that the loss caused by ergot (*Claviceps purpurea* Fr., Tul.) in rye is represented not only by the actual number of the sclerotia, but also by a large number of blasted kernels and empty florets. Diseased spikes were found to be shorter in length and lighter in weight than healthy ones.

Control Measures.

These may be summarised as follows:—

1. Proper precaution in the selection of the grain seed; in other words, the use of seed free from ergots.
2. When detected in the harvested product, the sclerotia must be shaken out or the product discarded.
3. When ergot appears in abundance on grasses in the pasture, either animals must be taken off until the ergot falls, or, where possible, the grass may be mowed with a machine the blade of which may be set high. In the latter case subsequent raking may be unnecessary.

In February, 1921, the Manager of Bathurst Experiment Farm submitted specimens of Blue grass (*Andropogon intermedius*) to the Biological Branch for examination. A sticky secretion was found associated with the panicles, due to the presence of the sphacelial stage of *Claviceps* sp. This phase of the fungus is microscopical. The ergot form was not found on these specimens.

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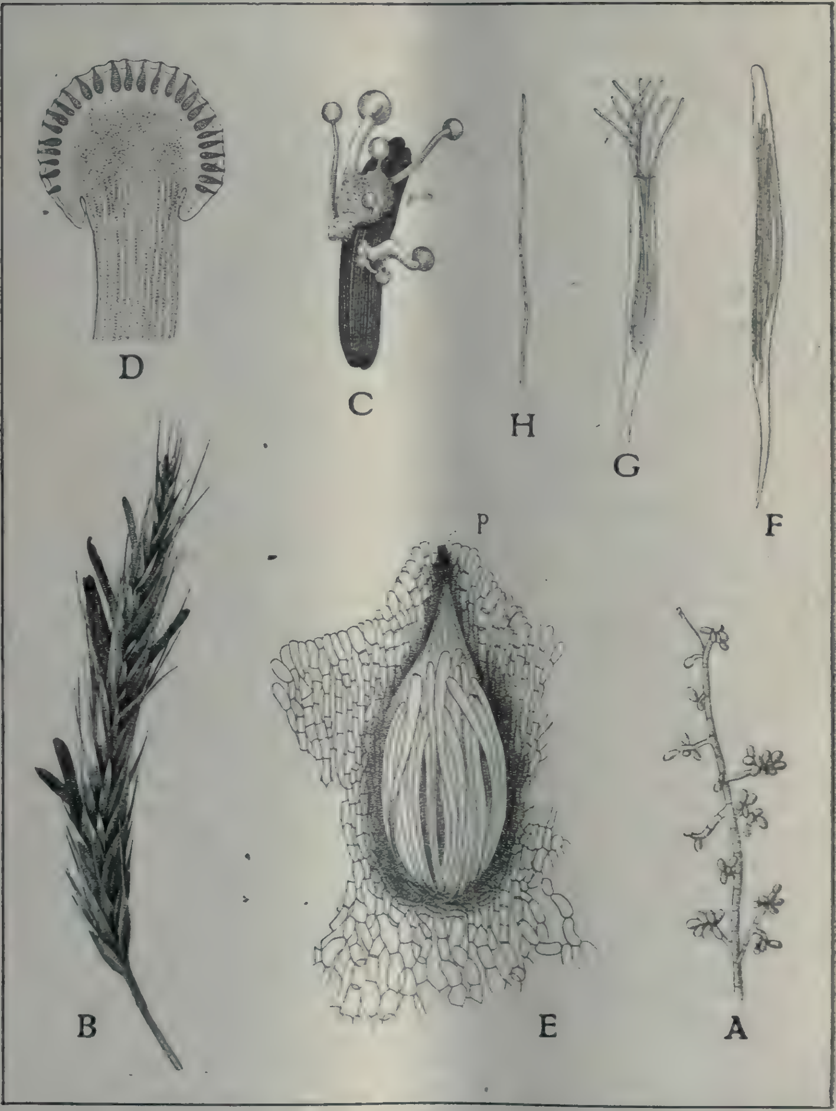
* *Phytopathology*, Vol. II, No. 1, p. 41, 1921.

In March, 1921, the Manager of Glen Innes Experiment Farm submitted the following attacked by *Claviceps* sp., the ergot stage being present in each case: Wheat, rye, Hungarian or Awnless Brome (*Bromus inermis*), a canary grass (*Phalaris minor*), Loietto rye grass (a variety of *Lolium multiflorum*



Claviceps purpurea.—A, Conidial or sphacelial stage B, Ear of rye with several ripe sclerotia (ergots) C, An ergot producing stalked bodies with swollen heads D, A longitudinal section through one of the heads, showing the cavities in which the spore-sacs are borne. E, A single cavity showing the spore-sacs. F, An ascus, or sac, showing eight thread-like spores. G, A ruptured sac with escaping spores. H, A single spore. (A, after Brefeld; C-H, after Tulasne; B, after Strasburger.)

and three varieties of fescue, Tall (***Festuca elatior***), Giant (***Festuca arundinacea***), and Hooker's (***Festuca hookeriana***, syn. ***Schedonorus hookerianus***). Mr. Little, the Experimentalist, states in his report to the Manager of the Farm that "all the later crops and late growth of grasses are badly infected, whilst the earlier varieties and early growths of grasses were practically free."

Ergot appears to be more prevalent in warm moist seasons. Some previous records of this fungus in Australia are:—Hooker's fescue (Glen Innes Experiment Farm, 1914) and wheat and rye (Glen Innes, 1914). McAlpine records it on Perennial rye grass (***Lolium perenne***) and Darnel (***Lolium temulentum***) in Victoria.*

Three species of *Claviceps*, the commonest of which is ***C. purpurea*** have been recorded from grasses. The other species are ***C. microcephala*** (Wallr.) and ***C. setulosa*** (Quel.) on Poa.

Specimens of ***Pollinia fulvum*** (Sugar grass) and ***Panicum bulbosum*** (Panic grass), attacked by ergot (*Claviceps* sp.) have recently been submitted to the Biological Branch by the Principal of Hawkesbury Agricultural College.

A QUERY CONCERNING A LICHEN.

"I AM forwarding specimens of wood containing a kind of red fungus," wrote Mr. J. R. Boller, Secretary of Bimbaya Branch of the Agricultural Bureau, in a recent letter to the Department. "Wood affected in this way seems to be wonderfully well-preserved and not to be attacked by white ants, old fences erected forty years ago being in a good state of preservation still, while others erected quite recently and not bearing the fungus are riddled with ants."

The specimen was subjected to examination by the Government Botanist, who reported that the wood was affected by a fungus or lichen-forming fungus, lichen being an association of algæ and fungi in a close relationship, in which each helped toward the life processes of the other. Before discussing the possible preservative effect of the lichen, it was necessary to consider the quality of the wood itself. The specimen appeared to have been split from a piece of red mahogany (*Eucalyptus resinifera*) and this was generally recognised as one of our first-class timbers. Formerly it had been used largely for fencing, but in its increasing scarcity recourse had been made to softer timbers. The latter were much more readily attacked by white ants and the actual resistance therefore seemed to be in the timber itself.

The algæ appeared to belong to the family *Palmellaceæ*, the host of a number of species of Lichenes usually found on fences of red mahogany. When such organisms chose for their substrata softer-wooded fence rails they tended to peel off with the surface of the wood as this became decayed by the weather. They were thus less permanent and conspicuous on the softer woods than on those of which the specimen submitted was representative.

In short, the resistance of the specimen to ants was due to the harder nature of the timber, and to this hardness was also due the pronounced growth of lichen.

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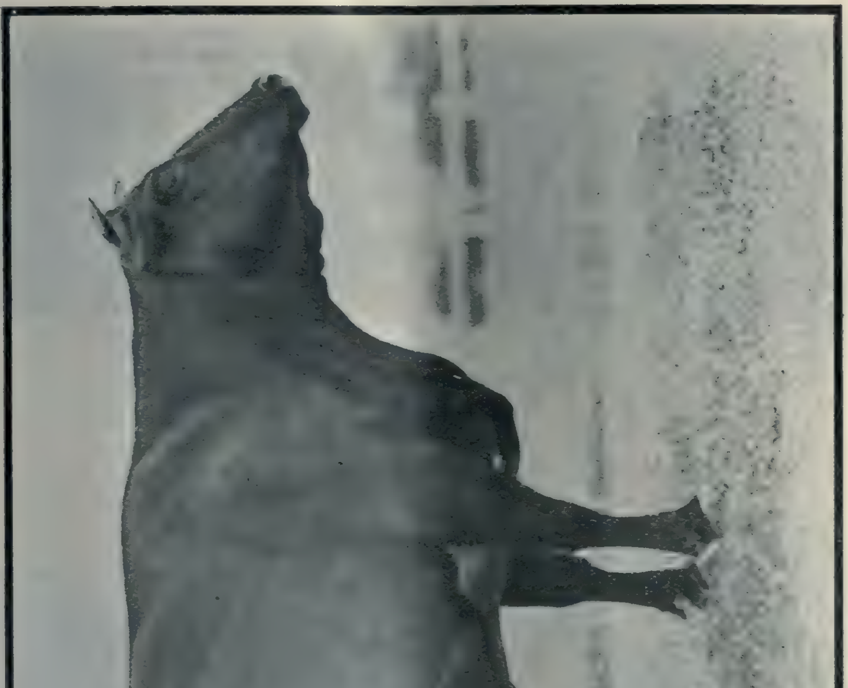
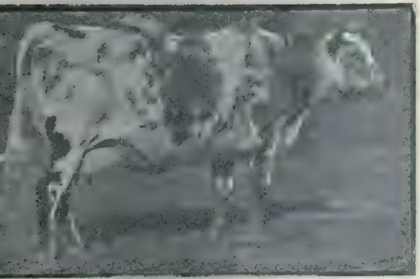
* "Systematic Arrangement of Australian Fungi," Department of Agriculture, Victoria, 1895, p. 110.



Melba XV of Darbalara.

By Kitchener of Darbalara (419) ex Melba VII of Darbalara (4181).



Madame of Bolaro.
The Foundation Dam and Dam of Melba I.

Melba IV of Darbalara.
By Carbine ex Melba I.
(No official record of Melba I.)

Melba VII.
By Emblem of Darbalara ex Melba IV.

Melba XV.
By Kitchener of Darbalara ex Melba VII.

Melba XXV.
By Silvermine of Darbalara ex Melba XV.

Guardsman of Darbalara.
By Climax of Darbalara ex Melba XXV.

A Milk and Butter Record.

MELBA XV OF DARBALARA.

L. T. MACINNES, Dairy Expert.

THE *Agricultural Gazette* in December, 1917, and January, 1918, gave an account of the performances of two pure-bred dairy cows belonging to privately-owned studs in New South Wales, which had exceeded the 1,000 lb. commercial butter standard in 365 days. These yields established records for milk and butter-fat production in this State. The butter-fat record was made by the Milking Shorthorn cow Melba VII, and that for milk by the Jersey Brighton Vanilla II. The latter's production has been exceeded since by the Milking Shorthorn Lovely II of Glenthorne.

A new champion has now appeared—indeed she can be termed an Australian champion in a double sense, for she is a daughter of Melba VII. On 2nd May this year Melba XV completed a 365 days' official test under the rules of the United Pure Bred Dairy Cattle Breeders' Association, having established new records for Australia for both milk and butter-fat production.

These efforts on the part of breeders to reach record figures are not confined to New South Wales. In the other States of the Commonwealth, in New Zealand, and especially in America, there is great competition going on amongst the different breeds, each striving to surpass its rivals. The record now established by Melba XV for Australia has been exceeded in New Zealand by the Friesian Burkeyge's Sylvia Posch, and by several cows in the United States of America. The New South Wales breeder—Mr. J. T. Cole, Manager of the Scottish-Australian Investment Co's Darbalara estate—has, however, as far as is known to the writer, the distinction of making these high productions hereditary. A successful stud-master is he who can breed a high-producing cow, but he is more than doubly successful who can establish a family of high producers, and make high production hereditary with both the male and female issues. Melba XV's family record has not only done this, but each generation has been an improvement on its predecessor, as the following table shows:—

	Milk yield.	Butter-fat.	Period.	Age.
	lb	lb.	days.	
Melba XV	21,635·5	954·472	365	4 years 8 months.
First dam Melba VII	17,364	870	365	6 ,,
Second ,, Melba IV	11,763	498	273	11 ,,
Third ,, Melba		No official record.		
Fourth ,, (foundation dam) Madame of Bolaro	7,763	308	273	16 ,,

Melba XV's daughter, Melba XXV, has this year completed a 273 days' test, giving 5,843 lb. milk, with 242 lb. butter-fat, as a 2-year-old heifer on her first calf. This compares favourably with the yields of her dam and grand-dam at the same age.

The records put up by Melba XV's sire, sire of sire, and grand-sire of sire are as follows :—

	Name.	No. of Daughters Tested.	Average Milk Yield per Cow.	Average Butter-fat Yield per Cow.	Period of Test.
			lb.	lb.	days.
Sire	Kitchener of Darbalara ...	2	12,613	522	273
Sire of Sire... ...	Emblem of Darbalara ...	16	9,023	385	273
Grand-sire of Sire ...	Banker of Bolaro	23	9,972	404	273

In five generations, with four descendants tested for the 273 days' period, at an age averaging 4½ years, the average production of Madame of Bolaro's family has been 10,287 lb. of milk, with 457½ lb. butter-fat.

Principal Rules Governing the Official Test.

It may be convenient to outline the rules under which tests are conducted by the Department in co-operation with the Association.

The standard for computing commercial butter from butter-fat shall be on the basis of 83 lb. of butter-fat in 100 lb. of butter.

All calculations made in computing the test shall be recorded as pounds of butter-fat, and as pounds of commercial butter.

Each test shall be over a period of twenty-four hours, and the milk shall be weighed and tested for butter-fat night and morning by a Government officer, who shall see that all cows are milked out prior to the test commencing.

The milk shall be weighed on approved scales and the weight recorded on a printed chart supplied for the purpose

The lactation period shall be 273 days, which shall be divided into a first period of thirty-three days, and eight following periods of thirty days each. The testing period of any cow may be extended to 365 days if requested by the owner, and to complete the term of 365 days the last two sub-periods shall be of thirty-one days each

As Melba XV was tested for the first sub-period within fourteen days, inclusive, after calving, the period of 365 days was covered by thirteen tests, the last test being taken three days before the expiration of the full period, or on the 362nd day after the commencement of the test.

All cows tested under the Pure Bred Cattle Breeders' scheme are classed under three scales :—

Scale A.—For cows tested for first time within fourteen days after calving, the first sub-period record is got by averaging the first and second test results ; the second record by averaging the second and third ; the twelfth record by averaging the twelfth and thirteenth tests. (Melba XV came within this scale.)

Scale B.—For cows tested fifteen to twenty-four days after calving the calculations are made on the actual tests, no system of averaging being resorted to ; the period of 365 days is covered by twelve tests only.

Scale C.—For cows tested twenty-five or more days after calving, the first record is made on the first test figures without averaging. Each succeeding calculation is computed on an average with the preceding tests ; that is, the second record is got by averaging the first and second tests, and the last sub-period by averaging the eleventh and twelfth tests. The 365 days is covered by twelve tests.

The object of this system of averaging is to endeavour to make the sub-period covered by each test equal as nearly as possible to fifteen days, although the tester's visits may be at thirty-day intervals only. In all cases the yields of sub-periods are calculated and recorded in terms of butter-fat, and at the end of the full period the fat column is added up and the total recorded.

A foot-note to each record sheet shows the estimated pounds of commercial butter as calculated on the Association's standard. This standard was arrived at from the average butter-fat content of choicest pasteurised butter made in New South Wales, which, after exhaustive analysis extending over twelve months, was determined at 83·37 per cent. As the fraction would be inconvenient in calculation, the nearest whole number (83) was taken as the base.

All comparisons are, however, made officially in terms of butter-fat, as the butter standards vary considerably in each country where dairying and testing is carried on. It is to be hoped that before long the publication of records in terms of commercial butter will cease everywhere.

Melba XV's Performance.

Melba XV calved on 28th April, 1920, and was tested for the first time on 9th May. Details of each sub-period's test are given in a table hereunder. She was milked twice daily only, was housed at night during the winter, and at other times was allowed to graze in the open.

Melba XV is a deep red, well-framed cow, showing good constitution, and Milking Shorthorn type, and well-developed udder and milk veins. She was served by Lily's Cupid of Darbalara on 21st October and again on 27th of the same month by the same bull, but she came in season again some months later, and was finally served to Limelight of Darbarlara on 31st March, 1921, and now appears to be in calf.

Feeding.

The Manager of Darbalara estate gives the following information under sworn statement as to the food given during the full period of the test:—

564 lb.	wheaten chaff.
3,003 ,,	boiled maize (grown on the estate).
2,110 ,,	wheaten bran.
1,698 ,,	,, pollard.
1,135 ,,	linseed meal.

The fodder was valued at £50 11s. 9d., and in addition the quantity of green fodder (grown on the estate) and pasture consumed is valued at £10 8s., or a total value of £60 19s. 9d.

The green fodder supplied was:—June to September inclusive, a small quantity of oaten hay and lucerne. January to March inclusive, a small quantity of green maize and lucerne.

Approximating the average return for the year's commercial butter at 2s. per lb., and allowing 1½ per cent. to represent roughly the losses entailed in separating and churning the cream and in packing the butter for market, the value of the cow's production works out as follows:—

Butter-fat	£109	13	4
Skim-milk	16	4	6
Total	£125	17	10

Deducting from this the cost of feeding, £60 19s. 9d., leaves £64 18s. 1d., out of which has to come the attendance and labour expenses. The value of any progeny that may be got, not only on the present calving but from the past and future ones, as well as the enhanced value of the progeny from any of the Banker and Madame Melba families, has also to be credited to the earnings of this cow over the past twelve months. This sum cannot be even approximately estimated, but it may run to thousands of pounds. For instance, the yearling bull calf of Melba XV's daughter was sold in March last at 400 guineas, a price far in advance of any previous sale made of this strain, and one result of his grand-dam's production as revealed by the test then just about to be completed.

Melba XV's Pedigree.

On the dam's side, the pedigree of Melba XV is as follows:—

Dam—Melba VII of Darbalara.
Sire of dam—Emblem of Darbalara.
Second dam—Melba IV of Darbalara.
Sire of second dam—Carbine of Darbalara.
Third dam—Melba of Bolaro.
Sire of third dam—Banker of Bolaro.
Fourth dam—Madame of Bolaro.
Sire of fourth dam—Heather of Bolaro.
Fifth dam—Podge.
Sire of fifth dam—Major V.

On the sire's side the pedigree is:—

Sire—Kitchener of Darbalara ex Lily II of Darbalara.
Sire of sire—Emblem of Darbalara ex Madame of Bolaro.
Grand-sire of sire—Banker of Bolaro ex Violet.

Lily II gave 8,798 lb. milk with 335 lb. butter-fat in 273 days when 8 years old. There is no official record of Violet's production.

The following is the official record of Melba XV's performance:—

Date of Test.		Milk, lb.	Fat, %	Butter Fat, lb.	Butter Fat, per day.	Butter Fat, for Sub-period.	Milk, per day.	Milk, for Sub-period.	Sub-period, days.
					lb.	lb.	lb.	lb.	
1920.									
9 May ..	Evening	32½	5·0	1·625	Averaged with June.				
,, ..	Morning	36	4·4	1·584	3·3325	109·972	73¾	2,433·75	33
11 June ..	Evening	37	4·8	1·776	Averaged with July.				
,, ..	Morning	42	4·0	1·680	3·085	92·55	74¾	2,242·5	30
10 July ..	Evening	35½	3·9	1·384	Averaged with August.				
,, ..	Morning	35	3·8	1·330	2·859	85·77	72¼	2,167·5	30
13 August ..	Evening	39½	4·2	1·659	Averaged with September.				
,, ..	Morning	34½	3·9	1·345	2·838	85·14	71¼	2,137·5	30
12 September	Evening	34½	4·0	1·380	Averaged with October.				
,, ..	Morning	34	3·8	1·292	2·797	83·91	69	2,070	30
17 October ..	Evening	34	4·0	1·360	Averaged with November.				
,, ..	Morning	35½	4·4	1·562	2·92	87·6	67¾	2,032·5	30
9 November	Evening	32	3·7	1·184	Averaged with December.				
,, ..	Morning	34	5·1	1·734	2·767	83·01	62	1,860	30
5 December	Evening	28	4·2	1·176	Averaged with January.				
,, ..	Morning	30	4·8	1·440	2·508	75·24	55	1,650	30
1921.									
4 January ..	Evening	25	4·2	1·050	Averaged with February.				
,, ..	Morning	27	5 0	1·350	2·337	70·11	51¼	1,537·5	30
3 February ..	Evening	25	4·1	1·025	Averaged with March.				
,, ..	Morning	25½	4·9	1·249	2·226	66·78	45¼	1,357·5	30
3 March ..	Evening	18½	4·8	·888	Averaged with 3rd April.				
,, ..	Morning	21½	6·0	1·29	1·96	60·76	36¾	1,139·25	31
3 April ..	Evening	15	5·2	·78	Averaged with 29th April.				
,, ..	Morning	18½	5·2	·962	1·73	53·63	32½	1,007·5	31
29 April ..	Evening	14½	5·4	·783	....	....	....	....	....
,, ..	Morning	17	5·5	·935					
				Totals ..	....	954·472	....	21,635·5	365

Estimated quantity commercial butter 1,149·966 lb.

Treatment of Scab in Seed Potatoes.

C. O. HAMBLIN, B.Sc., B.Sc.Agr., Assistant Biologist.

A METHOD for the treatment of scabby potato-seed by hot formaldehyde having been described in America,* it was suggested that the Biological Branch of this Department should try it on a small scale.

In June, 1920, 7 lb. of badly scabbed potatoes were secured. Examination showed that they contained the fungus *Rhizoctonia solani,* which was evident in the form of black nodular bodies (*sclerotia*) on the skin of the potato and fine fungus threads ramifying over the surface, affecting the eyes and causing very evident scabbing of the skin of the potato.

This badly-scabbed sample was divided into two equal parts, and one half was treated as follows:—A solution of one part of commercial formalin solution (known as 40 per cent.) in 120 of water was made and heated to 122 degrees Fah. The potatoes were placed in a wire basket and immersed for two minutes in the solution, placed on a draining board, and covered with a cloth that had been soaked in the hot solution and wrung out slightly. The tubers were left covered for one hour and then laid out on a bench till air-dry. The other half of the sample was not treated in any way.

The two parcels were forwarded to the Hawkesbury Agricultural College for planting. Sowing was carried out on 28th August, 1920, the two rows being placed side by side, 3 feet apart. The potatoes were 18 inches apart in the rows. Mr. Henrick reported that "germination was good throughout."

The resulting tubers were lifted on 25th January, 1921, and samples from both plots were examined at the Biological Branch on 31st January. The potatoes were carefully washed free of adhering soil without the skins being rubbed in any way, and each tuber was scrutinised in turn for the presence of scab diseases.

There are three main local causes of scab on potatoes, two of which are fungus diseases:—(1) *Rhizoctonia solani,* (2) *Actinomyces scabies* (Oospora scabies), and (3) Eelworms (*Heterodera radicicola*).

The second is difficult to detect, but it is not thought that it was present in the specimens sown or harvested. The first cause of scab was present in abundance. The third cause of scab is relatively common.

The following results were obtained upon examining each of the harvested tubers:—

	From treated plot.		From untreated plot.
Rhizoctonia scab	5		131
Clean	181		18
Scab of doubtful origin	11		8
Eelworms	26	*Rhizoctonia* and eelworms	8*

* Also included under *Rhizoctonia* scab.

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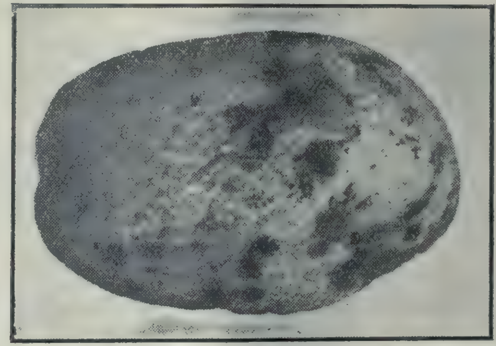
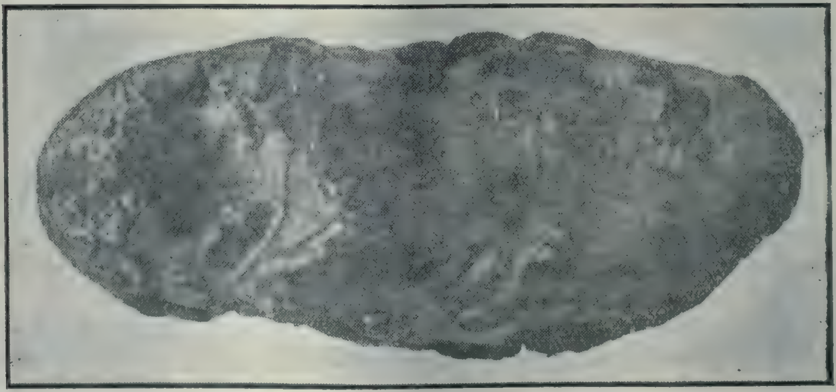
* An Improved Method of Potato Seed Treatment, I. E. Melhus and S. C. Gilman, Iowa A. E. Sta. Circ. No. 57, March, 1919.

The limited amount of scab present in the lot treated with the formalin solution was due to eelworms; even the five tubers showing *Rhizoctonia* with certainty were not badly affected, whereas in the untreated plot the tubers were very recognisably scabbed.

It is probable that the eelworm infection was from the Hawkesbury Agricultural College soil, for they are known to be present there among other crops.



Tuber showing scab due to *Rhizoctonia solani.*



Tuber showing scab due to Eelworms (*Heterodera* sp.)

The following conclusions might be drawn from the experiment:—

1. The hot formalin treatment controls *Rhizoctonia* scab of potatoes very effectively.
2. It has practically no effect on scab due to eelworms. (Eelworms penetrate the tissues of a tuber very deeply, and a satisfactory treatment of seed potatoes so affected is unknown; they should not be used for seed at all.)
3. The hot formalin treatment has not a detrimental effect on the germinating power of the seed tuber if the potatoes are unsprouted.

The method seems to be a useful one to recommend to farmers who are growing potatoes for seed purposes, and to other growers in districts where scab has proved troublesome. It requires care, as the temperature of the solution has to be noted with a thermometer and must be maintained while the whole parcel of seed is being treated. The method of dipping scabby potatoes in cold formalin solution requires a much longer period of immersion (one and a half to two hours), and is also somewhat likely to interfere with germination of the tubers. If this treatment with hot formalin solution is carefully carried out it should give highly satisfactory results for scab due to *Rhizoctonia solani.* Tests of the treatment on a field scale will be continued by the Department.

LUCERNE SEED CROP COMPETITION AT COOLAH.

THIS competition was inaugurated by the Coolah Agricultural and Pastoral Society, a prize of £3 3s. being offered for the best five acres of lucerne crop carrying seed.

Entrance was limited to the lucerne growers of the Coolah Valley, but a considerable amount of interest was also shown by growers in districts adjacent. The quality of the exhibits in most cases was high, and the lucerne growers of Coolah are to be congratulated on being able to show such good results for their work. The quality of seed produced this year will compare very favourably with that of other centres where lucerne seed is grown. The best crops of seed in the valley were seen in localities where water can be obtained at a depth of from 18 to 25 feet. The judging was carried out on 22nd and 23rd February, and the following table sets out the results:—

	Scale of Points.					
	Vigour and density of crop.	Evenness of crop.	Freedom from weeds and grasses.	Freedom from diseases and insect pests.	Uniformity of seed crop.	Total.
Maximum points	45	10	15	10	20	100
R. J. Crosswaithe (Plot No. 2), "Pilca Butta," Leadville ...	38	9	14	7	18	86
A. W. Bull, care of A. B. Stacy, "Cossington," Leadville ..	36	7	13	8	16	80
R. J. Crosswaithe (Plot No. 1), "Pilca Butta," Leadville ...	36	7	14	6	16	79
J. Mathias, Oban Soldiers' Settlement, Coolah	34	7	13	7	13	74
E. J. Scully, "Coolahville," Coolah	32	7	13	8	13	73
H. Wentworth, "Glencoe," Leadville (Plot No. 2)	35	7	14	7	9	72
R. J. Crosswaithe (Plot No. 3) ..	36	8	14	6	8	72
H. Wentworth (Plot No. 1), "Glencoe," Leadville	30	7	13	7	13	70
L. Wilson, Oban Soldiers' Settlement, Coolah	31	7	14	7	10	69
R. S. Stephen, "Mount Eva," Coolah	32	7	11	8	11	69

—J. N. WHITTET, Assistant Agrostologist.

The Testing of Pure-bred Cows in New South Wales.*

L. T. MacINNES, Dairy Expert.

During the twelve months now being reviewed dairy stock-breeders have had in some districts a uniformly good season; in others, like the Illawarra, the first half was bad, and not until the late spring was there any appreciable growth in the pastures. It is noted with satisfaction, however, that those submitting their cattle for testing are resorting more to hand-feeding and balanced rations, and are thus becoming to a greater extent independent of dry spells. It is recognised, though, that even with a good ration there is an immense advantage in good pastures, for succulent, green, milk-producing fodders and grasses act as a tonic and a medicine. There are differences of opinion as to whether it is better to supplement good pastures with dry hand-fed rations, or to supplement dry rations with good grasses.

The records this year, both individually and judging by standard age averages, compare favourably with those of any previous year. Further importations, especially of Jersey, Guernsey, and Friesian strains, have been made. These have been selected from recorded production strains, and should beneficially affect the productiveness of our dairy herds in years to come.

The recognition of the value of hereditary production is one of the most encouraging aspects of dairy stock breeding, not only here, but in other dairy countries. In this connection it might be noted that in Scotland, commencing from January this year, production is to be taken into account in judging dairy stock for show purposes. Out of the total points allotted for the score, 35 per cent. is given for production, the balance being divided between type, constitution, and general appearance. Production is also taken into account in making pure-bred sales in Scotland. The highest prices are paid for the high production record strains. This is on a line with our experience. Production was recognised as far back as 1914 on the North Coast (Richmond–Tweed district) in connection with show judging. At Bangalow the production classes have been a regular feature of the district show for the past seven years, and it is pleasing to state that this year the entries have been record ones in those classes, and they are likely to be extended.

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* Extracted from the official report presented to the annual meeting of the United Pure Bred Dairy Cattle Breeders' Association of New South Wales, covering the year ended 28th February, 1920.

It might be recommended to the Royal Agricultural Society that it give recognition next year to production classes, even if it were limited to a stipulation that any animal to be eligible for entry should furnish a record of a specified quantity of milk and butter-fat, or butter-fat alone. It could be guaranteed that the competition in any and all of such classes would be large and keen, and that they could be made the most prominent feature of the dairy stock section.

The Year's Work Reviewed.

NUMBER of privately-owned cows completing tests of 273 days.

Breed.	Prior to 30th June, 1917.	Year ending 28th February.				Increase at 1921 over 1920.	
		1918.	1919.	1920.	1921.	Number.	Percentage.
Milking Shorthorn ...	147	44	48	120	143	23	19
Illawarra	...	...	6	103	150	47	46
Jersey	579	19	28	59	53	(—6)	Decrease
Guernsey	37	7	9	18	23	5	28
Ayrshire	34	14	20	44	52	8	18
Friesian	...	...	13	21	20	(—1)	Decrease
Total	797	84	124	365	441	76	20·8

Animals reaching the official standards in less than the official period are included in the above table.

The increase of seventy-six shown in this table, while satisfactory, does not come up to anticipations. The Illawarra breeders are to be congratulated on showing the greatest advance. Jersey breeders ought not to allow the fact to pass that as regards their breed a considerable decrease is shown. The total number tested is the highest for any one year since the inauguration of the scheme.

The number of Government cows completing the same period or reaching the required standard under 273 days was ninety-one, as against sixty-four last year, an increase of twenty-seven.

The total number of private and Government-owned cattle tested for the full official period or reaching the standard under 273 days was 532, as against 429 last year, an increase of 103, or 24 per cent

The total number undergoing test on 1st March, 1920, was 473, so that this year's figures show an increase under this heading of fifty-one, of which twenty-nine are private, and twenty-two Government-owned.

The number withdrawn without having completed their test was 100 less than for the previous year. Of the 173 shown withdrawn during the past twelve months, ten were from the Government studs.

Summary of all cows tested for 273 days during the year, or reaching the standard under 273 days.

Breed.	Tested for 273 days.			Number on test 1st March, 1921.			Total Number withdrawn during year.
	Private.	Government.	Total.	Private.	Government.	Total.	
Milking Shorthorn	143	30	173	146	31	177	40
Illawarra	150	...	150	153	...	153	70
Jersey	53	30	83	71	17	88	18
Guernsey	23	26	49	27	29	56	22
Ayrshire	52	5	57	15	13	28	21
Friesian	20	...	20	16	...	16	1
Red Poll	...	...	...	...	6	6	1
Total ...	441	91	532	428	96	524	173

The total number of records of cows officially tested and reaching the 273-days official standard is as under:—

Number to 1918	1,547
„ during 1918–19	170
„ „ 1919–20	429
„ „ 1920–21	532
Total to 1st March, 1921 ...	2,678

The total of 2,678 includes both Government and privately-owned stock. In addition, a considerable number have been tested and for various reasons withdrawn from test before the expiration of the official period, or without reaching the official standards for that period. These amount to 936.

Number of privately-owned herds tested to 1921.

Breed.	1918.	1919.	1920.	1921.	Increase of 1921 over 1920.
Milking Shorthorn ...	4	13	18	24	6
Illawarra	2	10	19	29	10
Jersey	4	10	14	12	(–) 2
Guernsey	1	5	7	6	(–) 1
Ayrshire	1	3	7	5	(–) 2
Friesian	1	2	3	3	......
Total	13	43	68	79	Nett gain 11

It is again satisfactory to note that the number of private herds has increased by eleven. Such increase is even more satisfactory than the increase in the total number of cows being submitted for test, as it shows the continued expansion of the movement over a wider area, thus bringing many fresh centres under the leavening influence of the scheme.

TABLE showing total number of cows tested, &c.

Breed.	Total number tested.			Number reaching standard.			Number below standard.			Percentage of those below standard to total tested.
	Private.	Government.	Total.	Private.	Government.	Total.	Private.	Government.	Total.	
Milking Shorthorn..	143	30	173	102	22	124	41	8	49	28
Illawarra	150	..	150	104	..	104	46	..	46	31
Jersey	53	30	[illegible]	45	29	74	[illegible]	1	9	11
Guernsey	23	26	49	23	22	45	..	4	4	8
Ayrshire	52	5	57	46	5	51	6	..	6	10
Friesian	20	..	20	16	..	16	4	..	4	20
Red Poll	..	..	..	..	..	..	..	..	.	..
	441	91	532	[illegible]	78	414	105	13	118	22

Last year 101 cows out of 429 tested (23 per cent.) failed to reach the standard. The number failing to reach the official standard both this year and last, may be accounted for by so many new breeders commencing to test. These do not immediately grasp the benefits of regular and proper feeding, the necessity of supplementing pastures by hand-feeding and balanced rations. The first year's experience generally suffices to induce breeders to give more attention to this phase of dairying. It is borne in upon them that they cannot get the maximum out of a cow unless they properly feed her, not only during the few days immediately prior to the tester's visit, but during the whole of the intervening time. Regularity of feeding is very important.

Features of the Year's Testing.

Several features of considerable interest come forward for special reference.

The record put up by Melba XV, daughter of Melba VII, is the highest yet achieved by any cow in Australia in 273 days, and it seems as if a record for the 365-days period will be put up also. Melba VII held the 273-days record for butter-fat production previously, and still holds it for the 365 days.

The number of cows, Government and private, giving over 10,000 lb. of milk and over 400 lb. of butter-fat was as follows :—

	Over 10,000 lb. milk.	Over 400 lb. butter-fat.
Milking Shorthorn ...	10	12
Illawarra	9	11
Jersey	...	3
Guernsey	1	1
Ayrshire	...	1
Friesian	4	2
	24	30

The high average test of the Illawarra cow, Rascal, while giving such a big yield of milk, averaging 45 lb. per day with an average test of 5·1 per cent., attracts attention.

The high average test of the Jersey 2-year-old heifer, Retford Gem, viz., 6·1 per cent., with 5,556 lb. milk, is quite noteworthy.

The high average test for the breed of the Friesian cow, Oberon's Pride, 10,078 lb. milk, 4·1 per cent. average test, and of three others of this breed ranging from 4 per cent. to 4·4 per cent., also deserves mention.

Lectures.

During the year fifteen illustrated lectures were given by the Dairy Branch on the testing scheme, specially featuring hereditary production. These lectures were well attended and served to bring the value of test records under the notice of some 500 or 600 people. Such propaganda should be a means of influencing many breeders to commence testing their cows, as well as educating dairy farmers as to the value of the pure-bred sire of production strain.

Herd-testing Associations.

The other branch of the testing movement continues to make progress—slow to be sure, but still it is progress. Several units have been added to the Tweed-Richmond Council, and an additional unit has started in the Bega district, and a third is being organised. Muswellbrook, on the Hunter River, and the Gloucester district have formed associations, the latter already being at work. Inquiries have been made by other districts. Altogether eleven units are now at work, testing some 10,000 cows, as against eight units with 8,000 cows twelve months ago.

Average Yields of Privately-owned Cows (273 days' test).

In the class 4 years and over, the average production over 273 days of all breeds tested shows an appreciable increase over the previous year, the figures being 7,015 lb. milk, 282 lb. fat for 1919-20, as against 7,160·6 lb. milk, 300 lb. fat for the year just ended.

In the class 3 years and under 4, the average fat yield was about stationary as compared with that of the preceding twelve months, while the milk production showed a small decline, the figures being :—

1919-20	6,479 lb. milk,	261 lb. fat.
1920-21	6,264 „	260 „

The Milking Shorthorns, Illawarras, and Ayrshires averaged below the previous year, while Jerseys, Guernseys and Friesians were considerably above.

In the class under 3 years, the average for the year 1919-20 was above that of last year, being as follows :—

1919-20	5,977 lb. milk,	251 lb. fat.
1920-21	5,537 „	235 „

Here the Milking Shorthorns, Illawarras, and Friesians declined, while the Jerseys, Guernseys, and Ayrshires considerably increased.

AVERAGE Yields of Privately-owned Cows.

Breed.	Average Yields.			Equal to or above Standard.		Yields in fat.	
	Milk.	Butter-fat.	Average Test.	No. of Cows.	Excess average fat.	Lowest.	Highest.
Four years old and over: Official standard, 249 lb. butter-fat in 273 days.							
	lb.	lb.	per cent.		lb.	lb.	lb.
Milking Shorthorn ...	7,417·3	298·7	4·03	44	49·7	171·43	773·3
Illawarra	7,134	294·6	4·13	74	45·6	135·26	635·51
Jersey	6,025·7	302·3	5·01	28	53·3	160·95	402·51
Guernsey	6,823 3	333·2	4·88	13	84·2	252·01	512·33
Ayrshire	7,733·1	305·1	3·95	19	56·1	188·4	410·23
Friesian	8,730·3	313·8	3·59	7	64·8	188·83	417·72
All breeds ...	7,160·6	300·2	4·19	185	51·2	135·26	773·3
Three years and under four: Official standard, 207 lb. fat in 273 days.							
Milking Shorthorn ...	6,366·1	258·3	4·06	23	51·3	161·01	512·56
Illawarra	6,025·5	248·5	4·13	9	41·5	151·56	330·29
Jersey	5.501·3	304	5·53	3	97	227·52	380·11
Guernsey	6,424·3	316	4·92	3	109	259·32	350·91
Ayrshire	5,842·8	231	3·95	8	24	208·96	281·1
Friesian	8,865·5	318	3·59	2	111	271·36	365·53
All breeds ...	6,264·4	260·0	4·15	48	53·0	151·56	512·56
Under three years: Official standard, 166 lb. fat in 273 days.							
Milking Shorthorn ...	5,677·4	236·5	4·17	25	70·5	164·94	319·9
Illawarra	4,895	193·3	3·95	12	27·3	116·24	319·53
Jersey	4,990	260·6	5·22	12	94·6	154·23	340·66
Guernsey	5,568·6	265·8	4·77	5	99·8	210·63	333·49
Ayrshire	5,854·9	241·3	4·12	19	75·3	160·34	343·18
Friesian	6,793·2	248·1	3·65	5	82·1	150·06	331·66
All breeds ...	5,537·4	234·9	4·24	78	68·9	116·24	343·18

Average Yields of Government Stock (273 days' test).

Of cows 4 years and over, the Ayrshires show an increased average yield of both milk and fat as compared with the yields for the year 1919–20. The other breeds (Milking Shorthorns, Jerseys and Guernseys) were lower. The average for all breeds was somewhat lower last year, as is shown by the following:—

1919-20 ... ... 6,391 lb. milk, 295 lb. fat.
1920-21 ... ... 6,357 „ 285 „

In the section 3 years and under 4, there is shown an increase in the average milk for the two years, as follows:—

1919-20 ... ... 4,963 lb. milk, 253 lb. fat.
1920-21 ... ... 5,164 „ 242 „

Here comparison is nullified by the fact that in 1919-20 only four cows of one breed (Jersey) were recorded.

In the heifer class there is a slight increase in the average quantity of milk, but a small falling off in the amount of butter fat, the figures being :—

1919-20, average production 4,629 lb. milk, 225 lb. fat.
1920-21, „ 4,649 „ 218 „

AVERAGE Yields of Government Stock.

Breed.	Average Yields.			Equal to or above Standard.		Yields in fat.	
	Milk.	Butter-fat.	Average Test.	No of Cows.	Excess Average fat.	Lowest.	Highest.
Four years and over : Official standard, 249 lb. butter-fat.							
	lb.	lb.	per cent.		lb.	lb.	lb.
Milking Shorthorn...	7,091·8	272·1	3·84	15	23·1	152·23	345·02
Jersey	6,175·0	317·0	5·1	12	68·0	248·1	477·04
Guernsey	5,200·0	271·5	5·2	10	22·5	199·86	330·98
Ayrshire	7,720·5	295·5	3·8	2	46·5	294·42	297·45
All breeds ...	6,357·4	285·1	4·48	39	36·1	152·23	477·04
Three years and under 4 : Official standard, 207 lb. butter-fat.							
Milking Shorthorn...	5,395·0	212·0	3·93	2	5·0	170·05	269·73
Jersey	4,924·0	258·6	5·2	5	51·6	219·74	290·86
Guernsey	4,782·2	247·5	5·2	8	40·5	189·55	310·15
Ayrshire	6,901·0	255·5	3·7	2	48·5	236·05	275·47
All breeds ...	5,163·7	242·4	4·69	17	35·4	170 05	310·15
Under 3 years : Official standard, 166 lb. butter-fat.							
Milking Shorthorn...	5,620·5	226·5	4·03	4	60·5	182·02	251·58
Jersey	4,099·3	209·1	5·1	10	43·1	175·74	233·28
Guernsey	4,701·3	224·3	4·8	3	58·3	201·21	243·44
Ayrshire	6,112·0	248·0	4·1	1	82·0	247·58	247·58
All breeds ...	4,649·5	217·7	4·68	18	51·7	175·74	251·58

Summary of Production Standards.

The following table shows the average yields of all Government and privately-owned cattle that have completed the 273-days tests during the last two years, compared with the official standards for the different ages :—

Class.	Official Standard	1920–21.		1919–20.	
		Average Yield.	In excess Standard.	Average Yield.	In excess Standard.
	lb. fat.	lb. fat.	lb. fat.	lb. fat.	lb fat.
4 years and over	249	298	49	284	35
3 years and under 4 ...	207	232	48	260½	53½
Under 3 years	166	255	66	246	80

A New Mealy Bug on Citrus Trees.

(*Pulvinaria ornata* n.sp.).

W. W. FROGGATT, F.L.S., Government Entomologist.

THIS remarkable coccid was received on 1st November, 1920, from Mr. H. Wenholz, of the Department of Agriculture, with the information that it was plentiful in all stages of development upon the foliage of a lemon tree growing in his garden near Sydney. The first specimens collected were adult female coccids that had not commenced to produce their ovisacs; in the absence of any woolly secretion they looked like abnormally large soft Lecaniums. The description of this bug is as follows:—

Adult female light olive green, the central area dull white, with a dorsal stripe of dull brown and two rows of spots of the same colour on either side. These are what Green calls "pigmented dermal cells," but under the lens look like flattened grains of sand under the skin; when treated in potash the whole of the derm has a regular shagreened appearance. General form broadly oval, with the margins flattened and the centre convex, both the extremities rounded. Valves of anal operculum almost triangular. Length, 6 mm.

The outer margins are fringed with short, glassy rods, with more spiny hairs on the anal lobes. In the immature females the marginal rods are longer, showing a socket-like structure at the base, the antennæ slender, and the eyes red. Antennæ composed of eight joints, first and second short, third longest, fifth short, with a long bristle on the side, sixth and seventh with scattered smaller hairs, and the eighth longer than preceding ones, irregular in form, and clothed with hairs. Legs stout, with a few hairs on femur, a long hair at the apex of tibia and a few short ones on the margins; claw long, upper digitules long hairs, with spatulate tips; lower digitules short, thickened clubbed processes.

Ovisac forming a soft pad of white wool behind the coccid distinctly fluted and finely waved, with a second irregular flocculent mass of white wool rising up from the hind portion of the dorsal surface, and falling forward over the front of the resting coccid, but always more or less erect.

Male puparia dotted all over the leaves, formed of the usual white semi-crystaline substance; elongate oval, with the dorsal surface flattened and the sides sloping; apex round, operculum truncate. Length, 2 mm.

In Green's paper, "A list of Coccidæ affecting various Genera of Plants" (*Annals of Applied Biology*, 1917), nearly a hundred different species of scale insects are recorded upon citrus trees, among them nine species of the genus *Pulvinaria*. The commonest and most widely distributed species is *Pulvinaria psidi*, described originally upon the guava in the Sandwich Islands, but since recorded by Green as common in Southern India, also upon guava and upon mango, tea, and coffee plants. From the Philippines it is reported upon fig, eugenia, and guava. This species covers the infested plants with its cottony ovisacs and produces so much honey-dew that they are smothered with black fumagine.

Pulvinaria tecta was described by Maskell from specimens sent to him by Olliff upon orange foliage submitted by a Sydney orchard. We have since had speciments upon native shrubs (*Acacias* and *Davesia*) from the neighbourhood of Sydney and Melbourne.

Both these species are allied to my new species, which, however, is more closely related to *Pulvinaria cellulosa*, described by Green from Ceylon upon citrus foliage; but none of these species, or others I have studied, have the remarkable dorsal plumes herein described, while the colouration of the adult females of the species under discussion before they commence to produce the ovisac is very distinctive. The arrangement of the dermal cells is quite different from those of *Pulvinaria cellulosa.*

My description has been made from living specimens before and after they produced the ovisacs, and the figures have been drawn from similar material.

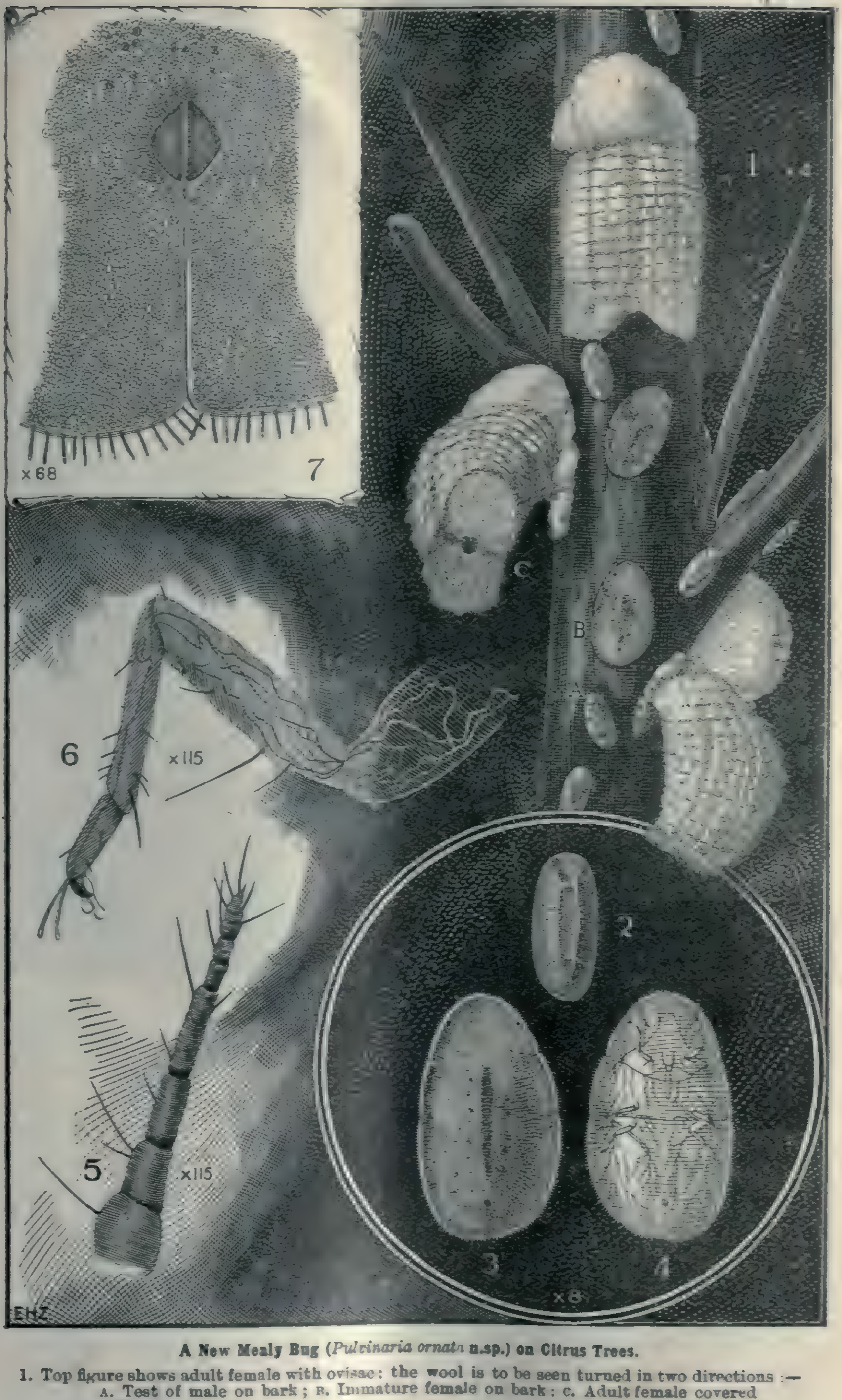
At my request Mr. Wenholz examined the plants in the vicinity of the lemon tree and found the foliage of a *Pittosporum undulatum* thickly infested with these mealy bugs. It would appear, therefore, that the pittosporum bush is the original or natural host of this mealy bug, from which it had migrated to the lemon tree.

FALLOW FOR THE CENTRAL WEST.

MEN of experience have remarked that the system of wheat-growing in parts of the western district is the worst in the State, and although this is rather a sweeping statement to make, and perhaps hardly warranted, it is nevertheless evident that there is ample room for improvement—an improvement which is sure to come within the next few years. The first great improvement will undoubtedly be the more general adoption of fallowing.

As fallowing has proved successful in the Riverina, is it not likely to give even greater results in the drier western districts? A farmer with a thousand acres of crop can perhaps afford to gamble on the season, as one good year will probably compensate for two bad ones, but a farmer with only 300 or 400 acres requires a return every year, and the surest way to get it is to sow only on fallowed land.—H. BARTLETT, Inspector of Agriculture.

HONEY from some sources will granulate with a very "freakish" appearance, sometimes conveying a wrong impression to the uninformed who regard granulated honey with suspicion, imagining it to be adulterated. Granulation is actually the best guarantee of the purity of a sample of honey. The misconception mentioned may be attributable to the fact that some honey, if not thoroughly ripe when extracted, will ferment, and occasionally give off a very offensive odour.—H. GRAHAM SMITH, Instructor in Apiculture, Hawkesbury Agricultural College.



A New Mealy Bug (*Pulvinaria ornata* n.sp.) on Citrus Trees.

1. Top figure shows adult female with ovisac: the wool is to be seen turned in two directions :—
   A. Test of male on bark; B. Immature female on bark: C. Adult female covered with ovisac.
2. Test of male enlarged.
3. Dorsal surface of female before producing ovisac.
4. Ventral surface of female, before producing ovisac.
5. Antennæ of 3 and 4.
6. Hind leg of 3 and 4.
7. Anal portion of 3 (dorsal).

A good crop of Sudan Grass at Terrigal.

Many heads ran 9 feet high.

The Pruning of Rome Beauty.

W. J. ALLEN.

THE yearling lateral of the apple is of two types; one carries diminutive, almost blind axillary buds, which, the following season, if not forced, will remain dormant; the other carries plump, well-developed buds, which, according to position, will either develop secondary laterals, or fruit spurs.

In many varieties, such as Gravenstein, Jonathan, Cleopatra, Dunn's, London Pippin, Stone Pippin, and generally Granny Smith, such a high percentage of the latter type of yearling laterals is carried that it is not necessary when pruning to take into consideration the few odd laterals of the other type carrying poorly developed buds, which occur on these varieties.

On the Rome Beauty, however, the position is reversed, as mostly this variety carries a yearling lateral with axillary buds of the poorly developed type; see Fig. 1. If such laterals are left untopped, they will often crop at the tip, and perhaps form a spur or two immediately behind the club where they cropped; they seldom form any spurs between this and their base (as in Fig. 2), or perhaps form no spur at all, as in Fig. 3.

A moderate cutting, shortening back by about half (see *a* in Fig. 1) of the same type of lateral is not altogether satisfactory, as the resultant spur formation will generally be only a modification of either Figs. 2 or 3. On the other hand, if these laterals are cut hard back to the two or three buds nearest their base (see *b* in Fig. 1), a strong lateral may be started into growth, and the remaining buds will mostly spur as in Fig. 4*a*, and in some cases no strong growth will start, but spurs or very short fruiting shoots, as in Fig. 4*b*.

As a matter of fact the yearling laterals shown in Fig. 1 are not their full length and do not show their base where they united with their parent limb. Usually the buds at the base cluster together more (see right hand lateral in Fig. 5), and thus the cut *b* shown in Fig. 1 would generally be closer to the base.

The above method of hard cutting of this type of lateral on the Rome Beauty apple has been very thoroughly tested out at our Bathurst Experiment Farm Orchard, and the results have been consistently satisfactory. If, however, on rich, deep soils, young and vigorous Rome Beauty trees should again throw only long growths instead of spurs or short fruiting shoots from where the laterals were cut hard in the winter, it would then be necessary to repeat the operation on the new growth in the latter part of January, or if not done then, at the following winter pruning.

The type of lateral with plump, well-developed eyes (see Fig. 5), if left long will generally crop on the tip, and also develop spurs along its length, as in Fig. 6. However in trees that are well furnished with spurs and not making abnormally strong growth, it is advisable to shorten such laterals slightly as at *b* in Fig. 5. With more slender laterals, or those situated on lower parts of the tree where a further vigorous growth is not expected, they may be shortened to about *c*, in Fig. 5, when a result as in Fig. 7 will follow.

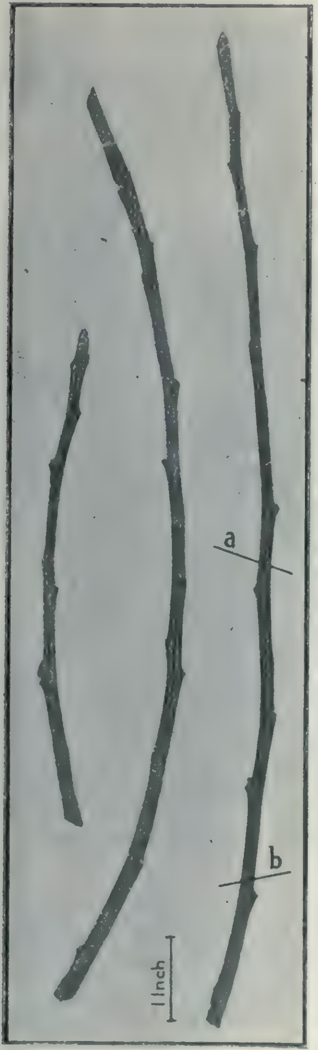


Fig. 1.
Yearling laterals of Rome Beauty carrying diminutive, poorly developed buds.

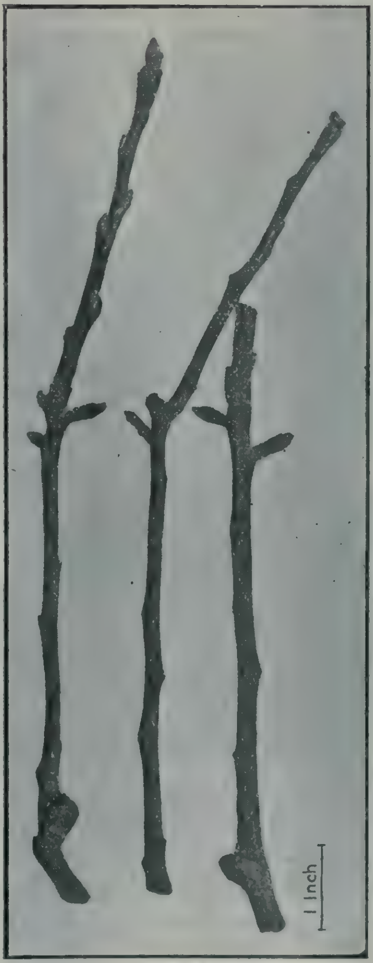


Fig. 2.
Two-year-old Rome Beauty laterals of the type shown in Fig. 1, untopped the previous season and showing spur development only immediately behind the club where they cropped.

On the coast and tablelands, as a rule, the yearling lateral with plump, well-developed buds is only of exceptional occurrence in the Rome Beauty, and is so conspicuous that a pruner can pick it out and deal with it as above without checking his speed. In some seasons this class of lateral will be

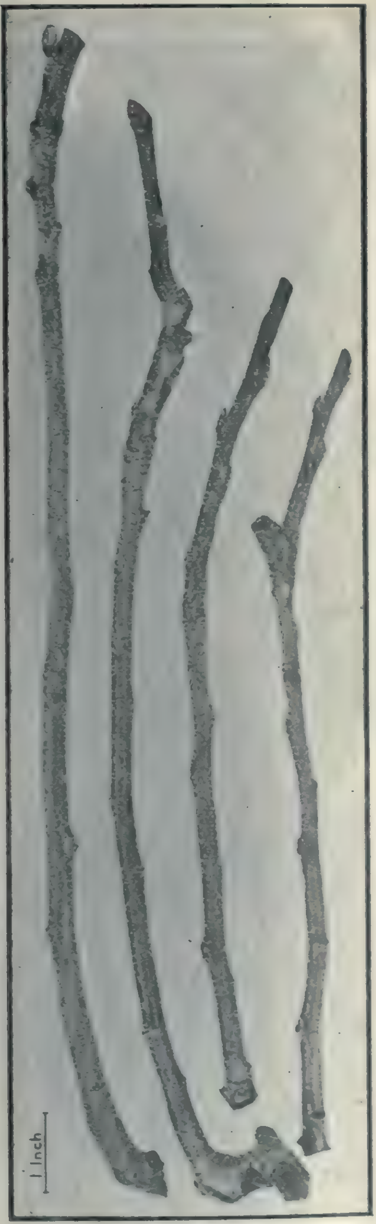


Fig. 3.

Two-year-old Rome Beauty laterals of the type shown in Fig. 1, untopped the previous season, and showing no spur development at all.

Fig. 4.

Similar two-year-old Rome Beauty laterals to those shown in Fig. 1, showing spurs and fruiting shoots developed from heavy topping.

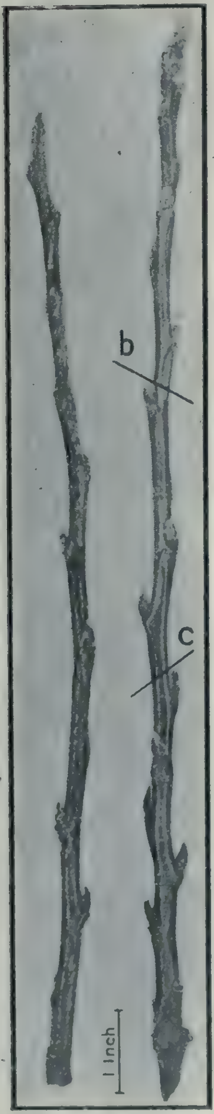


Fig. 5.
Yearling Rome Beauty laterals carrying plump, well-developed buds.

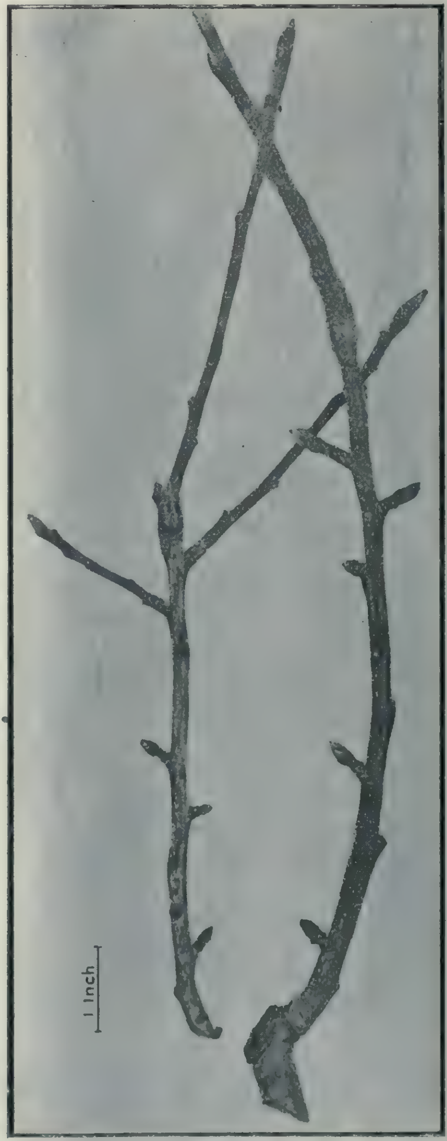


Fig. 6
Two-year-old Rome Beauty laterals, showing spur development from type shown in Fig. 5 when left untopped.

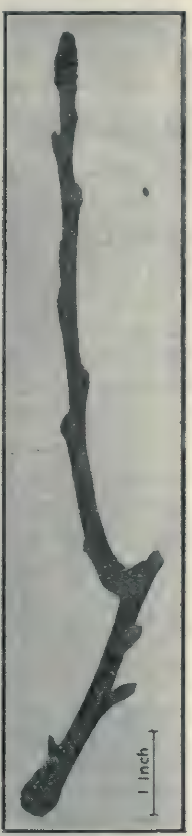


Fig. 7.

Two-year-old Rome Beauty lateral showing spur development when the type as shown in Fig. 5 is topped.

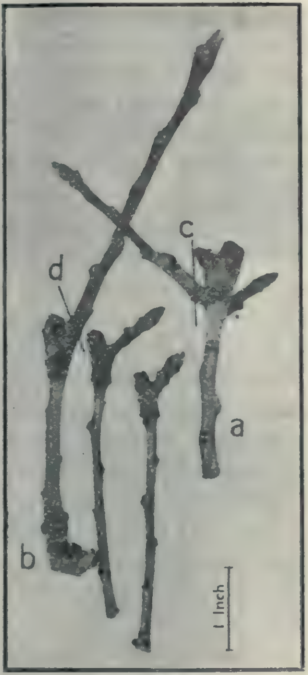


Fig. 9.

Two-year-old fruiting shoots.

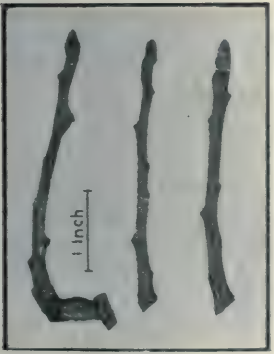


Fig. 8.

Yearling fruiting shoots of Rome Beauty.

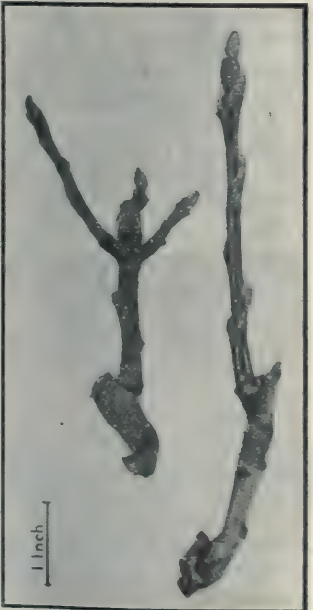


Fig. 10.

The result of cutting back the extension of a fruit shoot that failed to crop the previous season.

found quite abundant, even in districts where its occurrence is usually exceptional. This was the case a couple of seasons ago, and on that occasion it was also noticed that instead of developing into spurs, as usual, the buds blossomed and dropped out. In some of the warmer inland parts of the State, especially on the granite soils of the southern wheat districts, this type of lateral is usually very pronounced, and often the other type becomes the exception.

The fruiting shoot (in other words a very short lateral carrying a terminal fruit spur as in Fig. 8), can be left uncut; it will then generally crop on the tip, form a club, and either spur at the club or immediately behind it (see Fig. 9). If it should also make a shoot, as in Fig. 9 *a* and *b*, the extension should be removed close to the club as shown by the lines *c* and *d*. It will be noticed that Fig. 9*b* has cropped, clubbed, and made an extension, but has not spurred, but if the extension is removed as directed, a spur will form at the club, or directly behind it, during the following growing season, as in Fig. 9*a*. If a fruiting shoot fails to crop and club, but just makes an extension, the extension can be dealt with as a yearling lateral, that is, cut back to two or three eyes nearest its base. Fig. 10 shows the result from cutting in this manner the previous season.

DOLLAR WHEAT.

SOME prominence has been given to Dollar wheat, and Mr. A. E. V. Richardson, Superintendent of Agriculture in Victoria, whence the variety comes, lately afforded the information that it is a selection made by Mr. Muller, of Kinamatka, near Nhill, Victoria. It has done sufficiently well at Longerenong Agricultural College to justify its further trial.

In tests made in selection plots (one-twentieth of an acre), the yield of typical varieties was:—

Gallipoli	64 bushels.
Selected Federation ...	58 „
Dollar	51 „
Hard Federation ...	43 „

Mr. Richardson added that the small amount of seed obtained from these selection plots has all been distributed. It appears at the present moment that while the variety is a promising one, its yield in competition with standard types has not been unusually high.

SINCE the prohibition of beekeeping in box hives, the output of beeswax has largely been reduced, and the prices in Sussex-street have for some months remained firm in the vicinity of 2s. per lb. Large quantities of beeswax are used in the manufacture of comb foundation, and still larger quantities will be used for this purpose when beekeepers appreciate more fully the advantages of full sheets of comb foundation as a means of obtaining profitable brood combs.—H. GRAHAM SMITH, Instructor in Apiculture, Hawkesbury Agricultural College.

Pure Seed.

GROWERS RECOMMENDED BY THE DEPARTMENT.

THE Department of Agriculture now publishes monthly in the *Agricultural Gazette* a list of growers of pure seed of good quality of wheat, oats, maize, sorghum, Sudan grass, potatoes, and other crops, in order to encourage those who have been devoting attention to this sphere of work, and to enable farmers to get into direct touch with reliable sources of supply of such seeds.

Wheat :—

Bomen	Manager, Experiment Farm, Temora.
	Manager, Experiment Farm, Cowra.
	H. M. Hall and Sons, Studbrook, Cunningar.
Canberra	S. M. Haig, Lisburn, Wombat.
	H. K. Nock, Nelungaloo.
	E. J. Allen, Gregra.
	R. J. O. Berryman, Anicmoore, Botfield's Siding.
	Manager, Experiment Farm, Bathurst.
	Manager, Experiment Farm, Condobolin.
	Manager, Experiment Farm, Temora.
	Manager, Experiment Farm, Cowra.
Clarendon	J. Parslow, Collie-road, Gilgandra.
Cleveland	W. Burns, Goongirwarrie, Carcoar.
	Manager, Experiment Farm, Bathurst.
College Purple	Manager, Experiment Farm, Temora.
Comeback	Manager, Experiment Farm, Temora.
Currawa	Manager, Experiment Farm, Temora.
	Manager, Experiment Farm, Cowra.
	J. Parslow, Collie-road, Gilgandra.
Federation	Manager, Experiment Farm, Temora.
	Manager, Experiment Farm, Bathurst.
	J. Parslow, Collie-road, Gilgandra.
Firbank	Manager, Experiment Farm, Nyngan.
	Manager, Experiment Farm, Cowra.
	Manager, Experiment Farm, Condobolin.
	Manager, Experiment Farm, Temora.
	J. Parslow, Collie-road, Gilgandra.
Florence	Manager, Experiment Farm, Glen Innes.
	Manager, Experiment Farm, Trangie.
	Manager, Experiment Farm, Condobolin.
	J. Parslow, Collie-road, Gilgandra.
	H. K. Nock, Nelungaloo.
Genoa	Manager, Experiment Farm, Glen Innes.
Gresley	Manager, Experiment Farm, Temora.
	Manager, Experiment Farm, Cowra.
Hard Federation	E. J. Allen, Gregra.
	Manager, Experiment Farm, Cowra.
	Manager, Experiment Farm, Bathurst.
	Manager, Experiment Farm, Temora.
	Manager, Experiment Farm, Condobolin.
	Manager, Experiment Farm, Nyngan.
Improved Steinwedel	W. W. Watson, "Woodbine," Tichborne.
	Manager, Experiment Farm, Condobolin.
	Manager, Experiment Farm, Temora.
King's Red	Manager, Experiment Farm, Temora.
King's White	Manager, Experiment Farm, Temora.
Marshall's No. 3	Manager, Experiment Farm, Temora.
	Manager, Experiment Farm, Bathurst.
	Manager, Experiment Farm, Cowra.
Marquis	Manager, Experiment Farm, Glen Innes.
Major	W. W. Watson, "Woodbine," Tichborne.
	Manager, Experiment Farm, Temora.

PURE SEED—*continued.*

Wheat—continued.	
Onus	H. K. Nock, Nelungaloo.
Penny	E. J. Allen, Gregra. W. W. Watson, "Woodbine," Tichborne. Manager, Experiment Farm, Temora.
Roseworthy	H. K. Nock, Nelungaloo.
Thew	Manager, Experiment Farm, Glen Innes.
Turvey	W. W. Watson, "Woodbine," Tichborne. H. K. Nock, Nelungaloo.
Warren	Manager, Experiment Farm, Trangie.
Warden	W. W. Watson, "Woodbine," Tichborne. H. M. Hall and Sons, Studbrook, Cunningar. Manager, Experiment Farm, Temora.
Yandilla King	W. L. Forsyth, Braeside, Wallendbeen. E. J. Allen, Gregra. S. M. Haig, Lisburn, Wombat. H. M. Hall and Sons, Studbrook, Cunningar. Manager, Experiment Farm, Bathurst. Manager, Experiment Farm, Temora. Manager, Experiment Farm, Cowra.
Zealand	Manager, Experiment Farm, Temora. H. K. Nock, Nelungaloo.
Oats :—	
Algerian	Manager, Experiment Farm, Temora. Manager, Experiment Farm, Glen Innes. Manager, Experiment Farm, Bathurst. Manager, Experiment Farm, Cowra.
Ruakura	Manager, Experiment Farm, Temora. Manager, Experiment Farm, Glen Innes. Manager, Experiment Farm, Cowra.
Guyra	S. M. Haig, Lisburn, Wombat. H. K. Nock, Nelungaloo.
Sunrise	Manager, Experiment Farm, Cowra. H. K. Nock, Nelungaloo. Manager, Experiment Farm, Glen Innes.
Lachlan	Manager, Experiment Farm, Cowra.
White Tartarian	Manager, Experiment Farm, Glen Innes.
Barley :—	
Cape	Manager, Experiment Farm, Bathurst.
Kinver	Manager, Experiment Farm, Temora.
Goldthorpe	Manager, Experiment Farm, Temora.
Sudan Grass :—	Manager, Experiment Farm, Cowra. Manager, Experiment Farm, Temora. J. Cavanagh, Curlewis.
Clovers :—	
Shearman's Clover (roots)	J. H. Shearman, Fullerton Cove, Stockton.
Maize :—	
U.S. 133	P. Gersbach, Farm 330, Leeton.
Golden Glow	J. F Chick, Hillview, Tenterfield.
Silver King	A. Sommerlad, Hillcrest, Tenterfield.
Early Yellow Dent	Manager, Experiment Farm, Glen Innes.
Silvermine	Manager, Experiment Farm, Yanco.
Tunk's Yellow Dent	J. Ditzell, Lansdowne, Inverell.
Boone County White	J. Chittick, Kangaroo Valley.
Leaming	Manager, Experiment Farm, Grafton.
Golden Beauty	R. Richardson, Mondrook, Tinonee, Manning River.
Manning Pride	S. Smith, Karaak Flat, via Wingham.
Golden Nugget	J. W. Smith, Wauchope.
Manning White	A. McM. Singleton, Henley, Sydney.
Red Hogan	Principal, H. A. College, Richmond.

In addition to those tabulated a number of crops were inspected and passed for purity, but as the growers failed to forward samples their seed has not been listed.

With regard to Sudan grass, it should be noted that though listed above, it should not be sown until spring.

Vineyard Notes for June.

H. L. MANUEL, Viticultural Expert.

A START will be made at pruning on some of the vineyards this month. No hard and fast rule can be laid down as to the exact time to commence the work, as so much depends upon the vinegrower's experience with his varieties, and the seasonal conditions in his particular district. Where a district is subject to late frosts, pruning will be delayed as far into the season as possible. In a prolonged winter, some varieties, when pruned very late, show a decided improvement in the setting of their fruit. In the case of large vineyards, however, the grower is compelled to make an early start to get through his work.

The subject of pruning is a large one, and it cannot be dealt with fully here, but the following few remarks should prove useful. In the pruning of last year's plantings, except in the case of an odd, very vigorous grower, cut back and remove everything but one spur and cut that to two buds. Vines showing weakness require hard pruning. Vines that have been hard hit by downy mildew and other diseases this year will have made weak and sickly growth, and a certain amount of dead wood. Hard pruning and the removal of dead wood is essential in these cases, and will actually assist the vines to recover more quickly. The main object of the pruner should be to produce the happy medium between wood and fruit production. To neglect to study the health of the vine is to prejudice its future cropping capacity.

Pruning tools should at all times be kept in proper order. The blade of the shears should be sharp, and free from bevel or shoulder, for a shoulder on the blade causes splitting and bruising when the cut is made. Again, tools kept in good nick will greatly facilitate the work; the strain on the wrist is not so great, and the work can be done at a faster rate.

As a reminder to those who intend to practice field grafting later on, I may mention that the scion wood for the purpose must be reserved before the vine cuttings are burnt. To keep the cuttings in good condition, cut them directly after pruning, and tie in bundles of not less than fifty, placing the bundles in dry sand and covering them thoroughly. Where space permits, the cuttings can be put singly in rows. In both cases cover well with a deep layer of sand, and from time to time until they are required, they should be inspected as to the condition they are in. If they should show signs of drying out, uncover and allow them to soak in water for a day or two before replacing them in the sand; on the other hand, if the covering happens to be moist and is likely to force the buds to sprout, that trouble must also be guarded against.

Ploughing.

Where it is possible to delay the first ploughing until well into the season it should be done, but care should be taken not to be caught by dry conditions setting in early in the spring. The practicability of the advantages sometimes claimed for early ploughing I question, and my chief reasons for doing so are as follows :—

Soils of a clayey nature if ploughed early, will set very hard under the influence of the heavy winter rains, and being left in a rough state will materially affect the second ploughing. Not only will the work be uneven, but the rough state of the ground will increase wear and tear on the implements, and be exceedingly hard on the horses' shoulders. Harrowing the early ploughed ground will certainly get over this difficulty, but in harrowing early, the running together of the soil is hastened.

Weeds do not make much headway until the weather warms up later in the season, and rubbish growing on ground that is more or less rough cannot be turned under as satisfactorily as that growing on more level ground.

Where it is possible, then, I favour ploughing later in the season, and harrowing immediately afterwards. Under this treatment the surface soil does not receive the full mechanical force of the rains, and therefore remains in a more mellow condition for the second ploughing.

Before starting ploughing, the opportunity may be taken to apply lime and manures.

A BAD BEE-KEEPING PRACTICE.

A RECENT correspondent inquired whether, if he were to clip virgin queen bees for the purpose of forcing them to become drone layers for the production of drones for mating purposes, would such drones be good enough to mate with other queens?

Let it be said at once that the suggested practice is a very undesirable one. In the first place, if there is worker comb in the hive, the queen will select such comb to lay in, and the drones produced will be undersized ; and, if drone comb is used exclusively, the effect will be malnutrition, or undesirable drones of poor stamina. It is almost invariably noticed that, where there are a good number of drones raised as above, the percentage of improperly fertilised queens in the apiary is high. The stamina of the drone bee is, in my opinion, quite as important as that of the queen, and the best drones only should be produced, being raised naturally by the bees under stimulating normal conditions.

A good way to procure early drones is to stimulate by regular feeding a number of the best Italian stocks. The drones from undesirable colonies can be kept down by using for breeding purposes the best worker combs in the hives, and by the use (especially at the time when young queens are due for the mating flight) of drone traps.—W. A. GOODACRE, Senior Apiary Inspector.

Poultry Notes.

JUNE.

JAMES HADLINGTON, Poultry Expert.

As indicated in last month's notes, the hatching season should commence from 1st June, and all available eggs from the breeding pens should be set, although, in the case of those fortunate enough to have more than the ordinary number of eggs available, it might be of questionable wisdom to set too many incubators at one time, unless the brooding capacity is capable of handling all the chickens likely to be hatched. That is to say, with ordinary brooder units of, say, 100 capacity, it would not be wise to fill up at once—even if that were possible. It is better to co-ordinate the incubating and the brooder capacity by ensuring that a succession of chickens shall be hatched out each week, which at the end of six weeks will go out into the rearing pens in the same order. This will enable fresh eggs to be set every week instead of incubation having to be suspended, or overcrowding will occur owing to the pressure of chickens on the brooder space during the remainder of the season. In other words, we should not allow the desire to have a large number of chickens to weaken the systematic working of the whole plant. It should be borne in mind, too, that mere numbers of chickens will not make for success unless they are all reared well.

Any reader who has not seen the leaflet "Rearing and Feeding Poultry," issued in time for the Royal Show, should make application to the Under Secretary and Director, Department of Agriculture, Sydney, for a copy.

Substitutes for Bran and Pollard.

The question of finding some suitable substitute to take the place of at least a portion of the bran and pollard in the morning mash has exercised the Department of Agriculture for some considerable time; so much so that some months back a Foods' Investigation Committee was formed to go thoroughly into the matter of substitutes or supplementary foods. The limitations in these directions soon became apparent, and the problem is by no means as simple as might appear. One fact stands out very clearly—with the exception of lucerne, substitute articles of food are for the most part either too small in volume or higher in price than mill offal.

Of all the substitutes investigated that are likely to eke out the bran and pollard supply, none so far gives the same promise as lucerne ground into meal. Hitherto the drawback to the use of this article has been the temptation to use inferior lucerne in its manufacture, and it was seen that if this factor could be eliminated there was a wide field for its use.

In order better to secure the required quality and constant supply, the Department approached the Metropolitan Meat Industry Board with a suggestion that they should undertake the manufacture of this article from prime lucerne hay. The proposition has now been given favourable consideration by the Board, and as an outcome they have decided at once to instal machinery to manufacture lucerne meal. It is expected that the article will be available to poultry farmers by 1st July, at a price much below that now ruling for pollard and bran.

It is estimated that the quantity of bran, pollard, &c., necessary for the morning mash in this State, is about 12,000,000 bushels per annum, and as it has been amply demonstrated by the Department that we can use up to 15 per cent. of prime lucerne meal (perhaps even a little more), the addition to the poultry farmer's food supply is a very important one.

For some years the Department has advocated the use of lucerne dust in the morning mash, partly as a means of introducing variety to the ration and augmenting the food supply, but the intermittent supply, as well as the high price at which it has been sold has operated against its use except on a limited scale.

From time to time during the last few years machine-shredded lucerne has been put on the market, and offered to poultry-farmers as lucerne dust or under other names, but owing to the high fibre content of most of the samples (due probably to its being manufactured from old, stalky lucerne), it could not be recommended. However, the class of meal, or ground lucerne, intended to be manufactured by the Meat Industry Board will be in such a granular form as to make detection of inferior samples an easy matter for the poultry-farmer himself, without resort to analysis. But quite apart from this phase of the matter, the Meat Industry Board being a State institution with all the facilities of a big plant, cheap power and storage capacity, should be able to turn out a good article at a minimum cost.

The general satisfaction its products have given should inspire confidence in this new venture of the Board, which has been undertaken not so much for profit as to assist the industry.

Green Food—Its Use and Abuse.

The high cost and scarcity of foods for feeding poultry has resulted in chaffed green food being brought more generally into use as one of the ingredients of the morning mash. There is much to recommend this practice, not only from the point of view of economy, but as a factor in keeping the birds healthy. The practice could be extended with benefit to the industry; but the use of green food can be overdone to such an extent as to cause serious loss of egg production, and when this point is reached it can only be regarded as the abuse of a good thing. Many cases have come under notice during the last few months where very serious loss has resulted from attempts to feed laying hens on a diet too largely composed of green food. As much as two-thirds has been fed in some cases, and the effects could only be injurious.

In feeding a hen it should be recognised that she has not the capacity, even proportionate to her size, of a cow, horse, or sheep to deal with bulky vegetable matter. Large quantities of roughage must be fed to the larger animals, but it is the nature of the hen to feed on more concentrated foods, such as grain, seeds, &c., her anatomy being consequently altogether different. Not only so, but the hen is required to produce a highly concentrated product in the form of an egg, and the nutriment that it is possible for a hen to assimilate from the small amount of green stuff that her digestive system will deal with is altogether inadequate for the purpose of maintaining continuous egg production and repairing the waste of bodily tissue. If she is forced to eat a mash composed of too much of this class of food to the exclusion of a more concentrated and substantial diet, the first effect is a lower egg production. This has taken place on many farms without the reason even being suspected.

Economy in Feeding.

The use of more maize in feeding poultry has been previously advocated in these notes, and the reason for the course has been stated, but the continued high price of wheat as compared with that of maize at the present time, coupled with the extremely high cost of feeding generally, calls for a further reminder on the subject.

When it is remembered that the present cost of feeding per hen per annum on a wheat, pollard, and bran basis is, roughly, 12s., and that about 50 per cent of this amount, or 6s., is represented by the evening feed, it becomes a matter for serious consideration as to how far the use of maize will lower the cost of feeding, without loss of production. Experience tends to the conclusion that at least 50 per cent. maize can be used without ill-effects. This being the case, and taking wheat at 8s. and maize at 5s. per bushel, on the basis of three-quarters of a bushel per hen per annum (a fair average for ordinary hens), the evening feed per hen on wheat costs 6s., while on maize it would cost 3s. 9d. If we feed equal quantities of each in the evening ration the cost will be 4s. 10½d.—a saving of 1s. 1½d. per hen, or £56 5s. per 1,000 hens, or, roughly, 10 per cent. of the total feed bill.

This is one way in which the cost of production can be brought down, but there is yet another, and that is by careful feeding. On many farms there is undoubtedly a great wastage of food. One has only to visit poultry farms fairly continually to see feed lying about here and there—perhaps a little in each place, but amounting to a good deal in the course of a year. It might be averred that it is eventually eaten by the birds, but the experienced man knows that the greater part of the grain food thus left by the birds is eaten by sparrows, while the pollard becomes dried up by the sun until the poultry refuse to eat it, and eventually tread it into the soil of the yards. If 12s. is the cost of feeding hens under good management, what may it not be where waste is allowed?

Again, when the cost of feeding is abnormally high, many hens that might be profitable at other times fail to return even the cost of their feed, let alone yield a profit. These are small matters that have a tremendous bearing upon cost of production, and poultry-farmers must lower the cost of production or few will survive.

WHEN POLLEN IS SCARCE.

THE suggestion was lately made that the problem for young beekeepers during periods of drought is not so much how to get honey as how to get pollen, and certainly under the adverse conditions often experienced in many inland districts, the lack of pollen causes very heavy losses. Many apiarists in the last drought endeavoured to save their bees by feeding substitute foods. A suitable substitute for honey has been found in sugar syrup, but trouble came from feeding nitrogenous food, such as rye-meal, pea-meal, cocoa, &c., as a substitute for pollen. Such substitutes are valuable for a short period, but cannot be relied upon if the drought extends through the summer and autumn. The autumn is a period when young vigorous bees are necessary in the hive to carry the colony over the winter.

To minimise losses in bees during extreme conditions, three methods have been used with sufficient success to warrant mention.

1. During the first period of drought in summer pollen substitutes should be tried; small quantities of paste made of rye-meal or pea-meal, mixed with honey and fed inside the hive, should be given. Some apiarists prefer to feed the meal from trays about the apiary without mixing. Cocoa has lately come under notice and beneficial results have been reported by a number of apiarists.

2. If the drought conditions extend into the autumn, it will become a matter of preserving enough bees of sufficient stamina to carry the colonies over the winter, and to give a chance of recovery in the spring. If during progressive times the apiarist reserves a good number of combs which have pollen sealed under honey, then these can be distributed among the colonies, thereby giving a chance of a fair number of vigorous bees being raised, but pollen not sealed under honey deteriorates in value as a food.

3. The commercial apiarist should, if it is at all possible, take note of the flora, and if there is no promise of bloom, and it appears possible that the drought will continue, inquiries should be made with a view of finding a locality showing brighter prospects. The temporary removal of bees (usually toward the coastal districts) is the surest method available of minimising losses. Even late in the autumn, after all local prospect has vanished, a fair recovery can often be made in this way.—W. A. GOODACRE, Senior Apiary Inspector.

PERMITS FOR BEE RANGES.

OCCUPATION permits for the purpose of apiary sites and bee ranges are granted by the Forestry Commission in relation to State forests subject to certain conditions, rental, &c. The ranges embrace areas varying from one to three square miles, and the provisions under which they are granted preclude apiarists from being placed too close to one another. The Commission is willing to consider the interests of any apiarist adjoining a State forest, and it is always open to a bee-keeper so situated to apply for a permit over the adjacent State forest.

The issue of permits for bee-keeping on Crown Lands is a matter for consideration by the Department of Lands, which Department issues special leases for the purpose.

Orchard Notes.

JUNE.

W. J. ALLEN and W. LE GAY BRERETON.

PRUNING will be the main operation engaging the attention of the deciduous fruitgrower this month. We cannot go into the details of the subject in these notes, but a few hints will not be out of place. The pruner should remember that the first few years of the life of a tree are devoted to the establishment of a good framework, and he should have the design of the framework he is endeavouring to attain in his mind's eye. Such of the previous year's leaders should be retained as will best continue and multiply, the main limbs where necessary, and the remainder should be cut right out. A young tree will often throw over-strong laterals, which should also be cut right out, as laterals of this type will persist in growing, and will eventually make main limbs where they are not required; whereas if such strong laterals are removed altogether, when the growing point is further removed from these positions, laterals of a lighter type will appear that can be retained and easily managed.

Generally speaking one is apt to retain too many leaders, and thus multiply the main limbs before there is sufficient space for them. Though these generally can be removed later without great injury to the tree, when the overcrowding becomes more apparent, it is a very undesirable practice in varieties of apples liable to woolly aphis, as the heavy cuts which the removal of established branches necessitates take a long while to callous, and during that time they become breeding grounds for the aphides. With apples liable to woolly aphis especially, one should aim at leaving no strong growths that are not required for the future framework of the tree. When the superfluous strong shoots are removed as yearlings, the wounds very quickly heal over and cause no more trouble.

By cutting rather hard the main leaders that have been retained, an ample supply of strong shoots (leaders) is produced, from which choice can be made the following spring and summer for the multiplication and extension of the main limbs which form the framework.

The severity of this cutting back depends on the strength of the previous season's leaders, and also on the development of the framework.

If, after the full framework has been developed, the lower portions of the limbs are good and stout and the tree is still making strong yearling leaders, these can, under most circumstances, be merely thinned out to the desired number and left untopped for a season or more. This will often allow a tree to settle into cropping quicker, and also lessen the work in the following year's pruning.

Even when forming the young tree, it is necessary to keep in mind its cropping habits, but as the tree approaches its bearing age it is obvious that this knowledge becomes the main factor.

Each variety has its peculiarity, and moreover, will vary under the conditions prevailing in different districts, and it is only by close observation from season to season that a grower can arrive at the best treatment for each variety in his particular locality. A keen observer will find the tree itself the best instructor. Beginners should obtain a copy of the Department's book on "Pruning," which goes into the matter fully and will assist them to make an intelligent study of the trees.

Some General Principles.

Peaches and nectarines crop on the previous year's growth, both on laterals and short spurs. The latter are really only very short laterals, and are more prevalent on the nectarine than the peach, though some varieties of the latter fruit develop them freely. The important point, however, is that both laterals and spurs are only good for one season; consequently the peach must constantly be making ample new growth if it is to carry good crops.

The apricot will crop on the previous year's growth, and many varieties also on a spur that lasts, or naturally renews itself, for more than one year. Generally the apricot spur does not last like that of the apple or pear. Some varieties under certain conditions, indeed, develop very few spurs, their cropping being chiefly on the previous year's laterals; in such cases the management is similar to that of the peach.

European plums mostly crop on a spur either direct on the main limbs or on the two year or older laterals. Here again the spurs on some varieties are only short lived.

The Japanese plums mostly crop on both the previous growth and on spurs. It is, generally speaking, an easy tree to manage, as not only do the spurs crop for several years, but they are also easy to renew as they become spent.

The cherry crops on spurs on two-year-old wood and older. On most of the more widely-grown varieties the spur is long lived, but the Early Lyons is a notable exception, and is also difficult to manage in the matter of renewals.

Apples and pears will often crop on the tip of the yearling shoot, but generally the spur on the two-year-old or older wood is depended on for the crop. Their spurs are mostly long-lived and not difficult to renew, with exception, of course, of when they become spent.

The quince crops on a shoot that starts that spring.

The persimmon also crops on a shoot that starts that spring. In this way it may be likened to the cropping of the grape.

Though the cropping wood of some classes of fruit is only good for one season and that of others is good for several seasons, still the pruner's duty in either case is each season to look after renewals of spent wood. The habit of the individual variety must be observed, and these renewals assisted. The best results are obtained by following the natural habits of the tree, only modifying these habits, perhaps by accelerating the renewals or perhaps getting them in parts of the tree more convenient for the grower. Due attention, too, in some varieties, must be given at the time of pruning to the reduction of the prospective crop.

But necessary as pruning is, one should never forget that either in the young or old tree it is only a link in the chain of orchard operations, and the results aimed at in pruning will not materialise unless the tree is thriving. It is only under exceptional conditions that the tree will thrive satisfactorily, unless the other operations are attended to thoroughly and at the right time

Spraying.

This month is a good time to spray with lime-sulphur or Bordeaux mixture for leaf curl of peach or nectarine. In fact, the application cannot be delayed on early blossoming coastal varieties, like Bell's and Edward VII.

There is a decided saving in material in spraying after pruning, and where pruning is not complete it could be delayed with the more normal varieties till next month. It should be borne in mind that the best results in the control of leaf curl of peaches have been obtained by spraying before the buds are swelling, and it is better to spray both peach and nectarine trees before they are pruned rather than delay the application too long.

Ploughing.

Where orchards have been ploughed in the early autumn and there has been little weed growth since, there will be no need to bother again about this operation till the spring. But where no autumn ploughing was given, the plough should follow up each section that is pruned and sprayed. Though there are obvious advantages in this ploughing following the pruning and spraying, it should be completed by the end of July, especially where there is a sown cover crop or many weeds. To avoid the risk attendant on postponing the winter ploughing it may be necessary to allow the operation to precede the winter pruning and spraying.

Planting.

The present month is a good time for planting deciduous trees, provided the land is in good condition and moist, but not too wet. Deciduous trees make root growth long before the top starts, and it is a decided advantage to have them planted so that the first root growth takes place after they are in their permanent positions. Do not plant the tree deeper than it stood in the nursery.

The budding and grafting should be done so that the union with most trees is a couple of inches above the surface, and with apples liable to woolly aphis five or six inches above the surface of the soil. The roots should be placed with a downward tendency; this is more easily carried out if the centre of the hole is kept high. The soil should be pressed down tight around the roots when filling in the hole.

A leaflet on laying-out and planting fruit trees may be had on application to the Under-Secretary and Director, Department of Agriculture, Sydney.

A GOOD ration for the production of milk consists of 40 to 50 lb. lucerne hay or chaff per cow fed morning and evening, the quantity being varied according to the amount of grass available and the size of the cow. In addition, at each meal 4 lb. bran, 2 lb. maize-meal, and 2 lb. oil cake might be given.—L. T. MACINNES, Dairy Expert.

Agricultural Bureau of New South Wales.

REPORTS AND NOTICES FROM BRANCHES.

NOTE.—While gladly publishing in these columns the views of members of the various Branches of the Agricultural Bureau, the Department does not necessarily endorse the opinions expressed.

Auburn.

The first annual autumn show was held on 23rd April, and as an initial effort was a decided success. The show was opened by the Mayor of Auburn, and the exhibits, which were of high quality, were judged by Mr. Finch. The principal prize-winner was Mr. F. S. Burns.

Bimbaya.

A discussion on the competitive farm trophies at the Candelo show took place at a meeting of this branch on 19th April. The arrangements for the annual picnic also came under review. Mr. J. Alcock made some references to the farmers' experiment plots (maize) on his farm, and invited members to call and see them.

Mr. E. Breakwell visited the district on 21st April, and delivered a lecture.

GRASSES AND WEEDS.

Specimens of a number of varieties (including some undesirable ones) were exhibited. The lecturer said that certain essential principles should be observed by the dairy farmer if he was to get the best out of his land. These were :—(1) Variety of pasture; (2) subdivision of paddocks; (3) sowing of fodder crops to supplement pastures; (4) suppression and eradication of weed growth.

The best balanced ration for dairy cattle was a combination of grasses and legumes. For example, a mixture of Sudan grass and lucerne had proved to result in a considerable increase in the milk flow, as compared with grass alone or lucerne alone. The carbohydrates of a grass should be combined with the protein of the legume. Failing lucerne, leguminous feed was well provided for by clovers. This district was well favoured as to grasses suitable to the conditions, and there was no reason why different pastures could not be laid down in different paddocks. For example, there was the combination of paspalum and white clover as a summer pasture, or such grasses as kikuyu, Rhodes, and Sudan grass. For the cooler seasons such grasses as cocksfoot, giant fescue, *Phalaris bulbosa*, perennial rye, tall oat, and clovers such as Bokhara, Chilian and cow grass were suitable. A winter mixture which would give good results was 5 lb. *Phalaris*, 6 lb. cocksfoot, and 4 lb. Bokhara clover per acre. Alternative mixtures would be—12 lb. cocksfoot, 10 lb. perennial rye, 4 lb. cow grass clover per acre; or 10 lb. giant fescue, 4 lb. tall oat, 6 lb. perennial rye, and a few pounds of red clover per acre. He strongly advised farmers not to sow paspalum on the good alluvial flat lands, as they could be better utilised growing summer crops.

Mistakes were often made in overstocking or overgrazing pastures in their first stages of growth. A light feeding off was necessary, but it should not be overdone in the first year of growth, as the root system was not firmly established. Again, the pastures should be allowed to seed at periodical intervals, and this could not be done unless there was subdivision of paddocks, enabling each portion to be rested in turn. Over and over again it had been shown that dairy cattle responded to a change of pasture. Yet many farmers kept to the same old feed in the same old paddock.

Sometimes winter pastures failed, and it was advisable to supplement the pastures with cultivated crops—oats, wheat, field peas, &c. He thought much more could be done by sowing a strong growing clover like berseem with a light sowing of oats, as it was extremely nutritious, enriched the soil, and stood a fair amount of cutting.

Then the conservation of fodder in the form of ensilage was extremely helpful, and in a district where sorghum and maize grew to perfection, the building up of reserves of food for dry times was an easy matter. The importance of keeping the pastures free from weeds was also pointed out in some detail.

Borenore.

On 19th April, Mr. E. Breakwell, Agrostologist, delivered a lecture on weeds and grasses.

During the day Mr. Breakwell had made a collection of some of the weeds and grasses of the district, and these were labelled and fully described at the lecture. The worst weeds seen were false star thistle or St. Barnaby's thistle, Boggabri weed, stinking fat hen, Aaron's rod (wrongly called by many farmers wild tobacco), prickly lettuce, docks and sorrel, wild black currant, and wire or hog weed. Borenore could be classed as a fairly clean district, due probably to the thorough cultivation orchardists gave their land, but the roadsides still grew thistles in abundance.

There was great scope for improvement in the pastures of the district. Many of the native pastures contained too large a proportion of such grasses as wild sorghum, kangaroo grass, bearded grass and others. Where the native pastures consisted of such excellent grasses as wallaby or white top (*Danthonia*) and paddock love grasses they need not be disturbed, but when composed of the coarser grasses, much better results would be obtained by ploughing them up and laying down to good introduced grasses.

A splendid pasture, judging by results obtained on a small scale by Mr. Henderson and others, would be a mixture of *Phalaris bulbosa*, Bokhara clover and cocksfoot *Phalaris bulbosa* was the best winter grass he had seen growing in this district, and grown with Bokhara clover it would provide an ideal balanced ration. In growing cereal hay crops farmers would be well advised to try mixing about 12 lb. of Italian rye grass per acre with the oats or wheat. This grass, besides improving the quality of the hay, provided aftergrowth and good feed well into the autumn of the following year.

Regarding summer grasses, there were great prospects for elephant grass and kikuyu grass. Elephant grass stooled well and gave good feed. Kikuyu grass ran along the ground and succeeded in smothering summer weed growth. The Secretary, Mr. Henderson, had agreed to co-operate with the Department of Agriculture in growing promising grasses and clovers for the benefit and education of other farmers. Sudan grass had not given the same results as in previous years. This was undoubtedly due to the cold wet conditions which prevailed in December, as it was a grass that never recovered when the soils became cold and wet. In an ordinary season, however, it could still be strongly recommended.

Attention was drawn to the necessity for subdividing pastures and resting them occasionally in order to allow them to seed and thicken up. He also mentioned the possibilities of Shearman's clover in wet situations, Ladino clover (an improved form of white clover), and a perennial strain of prairie grass.

Coolah.

Mr. J. N. Whittet, Assistant Agrostologist, visited this centre late in the month of February and having inspected a number of crops of lucerne in connection with a local seed-growing competition, delivered a lecture on the subject of lucerne. A report on the seed-growing competition appears elsewhere in this issue.

Mr. Whittet confessed himself surprised at the manner in which lucerne thrived at Coolah, and anticipated a time when the district would be classed with the better-known parts of the State for its lucerne. There was a good demand for seed of good quality, but Coolah growers should cultivate a market. Already the majority of their seed was going to Melbourne, but although that was satisfactory it was not gaining them the name in their own State that they deserved, and they should consider that.

The soil in the valley readily formed a fine mulch, and only good methods were necessary to get a good stand. The value of top-dressing with 1½ cwt. to 2 cwt. superphosphate was emphasised.

The time to cut for seed was when the majority of the pods were yellow, germination tests having shown that the yellow seed came away better than the seed cut earlier or later. The cocks made in handling should be small and the handling, altogether, as little as possible.

Cooper's Shoot—Broken Head.

A branch has been formed at this centre, the first meeting being held on 23rd April, Mr. John Wright presiding, and Mr. J. P. Martin being appointed Hon. Secretary. Arrangements were made for the advantage of members in several directions. The chairman remarked that the class of member desired was the one who was out to learn all he could about his branch of primary production.

Cotta Walla.

A meeting was held on 18th April, when a recent demonstration of the use of explosive was discussed, and the question of the co-operative purchase and storage of explosives for the convenience of members was considered. The subject of handling farm horses was also usefully discussed.

Dapto.

A discussion took place at a meeting on 21st April on the means by which fertility might be restored to an impoverished soil.

Mr. W. T. Harris, who led the discussion, said that the absence of clover and rye grass was evidence of depreciation in the fertility of local soils. Green fodder crops also withdrew plant food from the soil, and it was felt that the time was coming when steps would have to be taken to improve the soil. There was a great waste of farmyard manure, which should be used to better advantage. It was wise to harrow manure in the cattle camps, after a light seeding of grass in the autumn. Artificial manures were also profitable, and he advocated their use in connection with crops, but in stricter relation to the soil he advocated the use of farmyard manure. Underground drainage was useful for taking off water that caused the ground to become waterlogged. Pipe drains were the cheapest in the end, as they involved far less labour. Surface drains were only for flood waters.

Mr. J. J. Cook was a firm believer in bonedust in preference to other manures.

Mr. J. Stevenson remarked that the manure of cattle fed on bran was far superior to that of cattle on other feeds, which seemed to him good reason for an increased use of bran. He advocated the growth of leguminous crops to improve the soil.

Mr. Harris believed in the continuous cultivation of the same paddock, but this was not approved by several members, who considered cultivation paddocks should be sown with grasses at times, and other paddocks cultivated.

Glenfield.

There was a large attendance for a lecture by Mr. J. Hadlington, Poultry Expert, on 12th April, the subject being the selecting and mating of poultry. The types of bird to be preferred were indicated by lantern slides, as also those that should be rejected, and a valuable portion of the evening was devoted to the answering of questions.

Glenorie.

A meeting was held on 16th April, when a discussion took place on die-back in citrus trees, several members detailing their experiences. The formation of a local co-operative society and erection of receiving depôts were considered, a committee having been appointed by the District Council.

The branch met again on 30th April, with a good attendance. Arrangements were advanced for an early pruning demonstration by an officer of the Department of Agriculture.

Delegates who attended a meeting of the Metropolitan branch reported on the demonstration and testing of canned fruit conducted at the meeting, and it was felt the information obtained was so useful as to justify the selection of delegates for each meeting of the Metropolitan branch.

Protest was expressed at the proposal to transfer the title "Great Northern Road" from the existing road to what is known as Marouta road (*viá* Windsor), the effect of which would be to divert northern traffic from the main and most direct road.

Kellyville.

Members of this branch met on 9th April, when a paper was read by Mr. H. Firth on lime and its uses on the farm.

Lidcombe.

At the last meeting of this branch papers were read by Mr. J. F. Hillson on manures and fertilisers, and by Mr. Lunney on the chemistry of soils and manures. The latter paper dealt with the history of the formation of soils from the rock, and also discussed the chemical and biological changes brought about under various conditions.

The following paragraphs are from Mr. Hillson's paper :—

THE USE OF MANURES AND FERTILISERS.

We sometimes hear the question, "What manure should I use for maize," or some other crop. The question cannot be properly answered unless we have some knowledge of the locality, and the class of soil it is intended to grow the crop in. To give an instance . Up near the border, a crop of maize was grown on land that had been in cultivation for over fifty years, and never manured. The crop was grown by a man whose grandfather used to grow maize there. The crop yielded somewhere between 50 bushels and 100 bushels to the acre. Now, if we tried to grow maize on some of the ti-tree scrub land of this district for five years without manuring, we would hardly get enough off it to feed a fowl. The winner of the sweet-pea prize last year at Sydney was quoted by the press as having used sulphate of iron with success. Another gentleman who also used it on his peas said there was practically little difference between those on which he used it, and those which were untreated. So, in using manures and fertilisers, we must use our heads as well as our hands, otherwise instead of getting larger crops we waste our money.

A man who has applied nitrate of soda or sulphate of ammonia to a crop of cabbage on land containing plenty of humus, finds his crop is a good one; having sufficient moisture, it has grown quickly. On clearing off the cabbage crop he plants, say, peas or beans, and again applies nitrate of soda or sulphate of ammonia. The result is, he gets plenty of haulm, but very few peas and beans. He would have done much better if he had used a little lime or wood ashes; or, in fact, no manure at all.

After growing cabbage or cauliflower, if I plant peas or beans, I use no manure of any kind. There is sufficient manure from the preceding crop.

There was a remedy printed in the press a short time back for tomato wilt. The writer stated that it was caused by poverty of soil; another grower stated it was caused by over-manuring. Well, my plants were raised in a hot-bed. I planted them out in land which had been used for cabbage nine months before; then a crop of peas was grown, after which the tomatoes were planted. A handful of wood ashes was given to each plant, and a very light dressing of lime scattered over the land was the only manure they received. I had a splendid crop of tomatoes, very few with wilt, and no black spot. A few plants I left in the hot-bed grew luxuriantly, having a dense mass of haulm and very few tomatoes and no wilt. "One swallow does not make a summer," but one trial convinces me that we must look elsewhere for the cause of wilt.

You must try out your own soil if you wish to know what manures it requires for the different plants you wish to grow. Have a trial patch, and use it for testing out the different manures on the plants you grow. This will in a measure prevent you from applying the wrong fertiliser.

Whatever the soil may be—clay or loam—we shall not attain the full benefit of any manure unless the land is in good tilth, well drained, and cultivated to a depth suitable to the crop we wish to grow. If we wished to grow, say, wheat, it would be a waste of time and money to make the land ready to the same depth as if we were making an orchard, or even a market garden, although in the latter case, a Chinese market gardener seems to be regulated by the length of the shovel blade. In wet weather in undrained land, the plants will be waterlogged, and in dry weather with no cultivation they will be stunted. Fertilisers are much more efficient on ground that is in good tilth than on cloddy, poorly-prepared land.

When manuring land and calculating the amount to be supplied we should take into account the amount of organic matter turned under in the shape of grass or weeds. It has been proved that 80 lb. of meadow grass ploughed in is equal in virtue to 100 lb. of farmyard manure. My practice is to endeavour to return to the soil all the grass and weeds, as I consider by so doing I am supplying what the soil of this district requires—plenty of humus.

There is one kind of manure that we never seem to get too much of, and which I am afraid we do not give sufficient time and attention to. I speak of what is called a compost heap, or, what would be better, a pit, so situated that surface water will not run into it, but yet so that the contents of the pit will not become dry or burn. This heap or pit should be made up with all the waste of garden, trees, and house, and is much improved by having the waste water and slops from the house thrown over it. If you have a hole dug so that the drainage runs into it, so much the better; you can then utilise the liquids in the making of liquid manure, or throw it back over the heap. Should the pit or heap smell strongly, ammonia is escaping, and by mixing some gypsum with the top layer the smell will disappear, or become what is called " fixed," the ammonia which was escaping being converted into sulphate of ammonia.

I gave sulphate of ammonia a thorough trial on a large patch of onions this season, on loamy soil. One part was treated with sulphate of ammonia and the other left untreated, but both parts were well manured with fowl and cow manure. About five or six weeks after planting out the onions, I commenced using the sulphate in liquid form, one tablespoonful to three gallons of water. The rows were 15 inches apart, and to ensure an even spread, and yet keep it off the plants, I made a spreader for the water can, which caused it to spread out to a distance of about 10 inches. One can was made to do one row, and an application was made once a week until the onions had bulbed, always making sure the soil was not in a dry state. The treated plot had far and away the best bulbs.

In my opinion, the reason why some fail in this, as well as with other fertilisers, is that they think if a little is good, more will be better still. It is useless mixing a certain quantity of a fertiliser with a given quantity of water, and then pouring it over a small portion of land. Nitrogen over-supplied in any form is more likely to do harm than good.

Lower Portland.

This branch met on 14th April, when the judges for the show were appointed, and other arrangements made for the event. It was decided to stage an exhibit at the Hawkesbury show.

March.

This branch met on 27th April, when members discussed with satisfaction the success of their exhibit at the recent Orange show, where the first prize was obtained from among four competitors.

Points were noted, and matters arranged in a preliminary way for the display to be staged at the 1922 Orange show.

Milton.

A meeting was held on 19th April, when Mr. A. A. Smart read a paper on the cultivation of lucerne, and thus initiated an interesting discussion. The following paragraphs are from Mr. Smart's paper :—

LUCERNE CULTIVATION.

The importance of this forage plant to the farmers and graziers of Australia cannot be over-estimated, and fortunate indeed are they who possess soil and climate favourable to its healthy growth and perfect development. I have no hesitation in stating that land capable of growing this most valuable plant is worth pounds per acre more than the land not suited to it. Lucerne has been said to be the most valuable of all fodder crops for a drought. It can be used for green fodder or silage, or it can be made into hay. Lucerne prefers a deep, well drained, calcareous loam, where it can send its roots deep down into the subsoil, out of reach of drought. It will keep green and luxuriant during the hottest months of summer, and is always ready to respond to a genial summer hower, or to irrigation.

There are three conditions under which lucerne will attain great perfection in this district. First, when the roots of the plants can penetrate to the natural water; second, when the soil is a friable loam, and the subsoil is of a fairly retentive nature, holding moisture during the hot and dry summer months; third, when irrigation can be applied.

The value of irrigation for producing heavy crops of lucerne in many parts of Australia cannot be over estimated. Lucerne will last from seven to twenty years in this district, and I have cut it from three to six times per year, and have made from four to seven tons of hay per acre per year. In preparing the soil for lucerne, the ground must be ploughed deeply, and three crops taken off before it is sown with lucerne. It is then ploughed, harrowed, and rolled, and the seed sown. One stroke of a very light harrow is sufficient to cover the seed, and then the land should be rolled again. Many seeds are buried too deeply and never germinate, and the seedsmen are blamed for sending inferior seed. From a quarter to half an inch of covering is sufficient. It is difficult to sow small seed like lucerne by hand evenly: the seed will slip through your fingers in spite of the greatest care, and the sowing will be irregular. It is impossible to throw small seeds any great distances. Some people advocate drilling, but from my experience of over twenty years, I am of opinion that broadcast sowing is to be preferred.

It is not advisable to break up virgin soil and sow lucerne as a first crop. A preparatory crop of cereals and then a root crop is most desirable. The best time to sow lucerne in this district is after the first autumn rain, say, March or April, while the soil is warm and moist. The quantity of seed to sow per acre is from 14 lb. to 17 lb., according to the germinating power of the seed. No heavy stock should be put on lucerne the first season after sowing. A mowing machine should be run over it when it becomes spindly, and it will branch out splendidly. At no time should it be eaten down too close, for lucerne rebels against being continually nibbled at. As soon as the crop has been eaten down it has a tendency to throw shoots for the next crop.

There is no doubt the best results can be obtained by cutting lucerne on what is known as the soiling system. As the word "soiling" is not generally understood among our young farmers, a little explanation may not prove out of place. Soiling really means cutting and carting the fodder to the animals. Several advantages are claimed for this system. First, that a given area of land will carry more stock; second, that more actual food will be produced from such crops as lucerne; third, that the food grown is more fully utilised; fourth, that milch cows thrive much better and produce more milk. Lucerne is a leguminous plant, and it obtains most of its nitrogenous food from the atmosphere. Potash, phosphoric acid, and lime are the principal constituents taken from the soil; this being so, I would recommend a dressing of good superphosphate, 2 cwt. per acre, and kainit, 1 cwt. per acre. A top-dressing of gypsum is beneficial later on.

It is well known that there is no difference botanically between various types of lucerne, although there is a difference in appearance. Some years ago I sowed some colonial seed of lucerne and some American seed. It was sown side by side under similar conditions. All came up well, and during the first season very little difference was observed, but during the second season the difference was very marked indeed. The produce of the colonial-grown seed was a foot higher, and yielded 100 per cent. more fodder than the American seed. The product of the colonial seed was of a robust growth and broad leaves, showing great vigour; the American article was puny and delicate, very fine and small.

A good stack of lucerne hay, to tide over the severity of a drought or of winter, would be invaluable. What can be healthier or better for stock that this product? It is so easily grown and handled. A few acres well attended can be cut three or four times a season, and a good stack obtained. It is well known that cows fed on green lucerne develop tainted milk, but the cream can be pasteurised, and this will get rid of the tainted flavour. In hot weather cows should not be left longer than fifteen minutes in a lucerne crop while it is in succulent growth, or they will develop hoven. In cold weather they may be left a little longer. Lucerne is the kindest of all crops, and every farmer should grow from 2 to 5 acres or more. I do not know of any farmer within a mile or two of Milton who has not got some land that will grow lucerne. There are hundreds of acres of suitable land in the district if properly cultivated, and I hope in the future more farmers will try an acre or two for experiment. With proper cultivation and handling I have no fear about it being a success.

Departmental Note.—The Chief Inspector of Agriculture in commending this very practical paper, remarks that the Department's experiments have shown that top-dressing with 2 cwt. of superphosphate is valuable, and no other fertiliser or mixture is so profitable. Farmers should test it in small areas on their own farms before trying it on a larger scale.

Mittagong.

The branch met on 23rd April, when a discussion took place on the means by which local interest in the Bureau could be increased; those present evinced confidence in the usefulness of the institution.

General satisfaction was expressed at the branch's success at the Moss Vale show, where the shield for the best Bureau exhibit was won. It was agreed to ask other branches in the Berrima district to attend a joint meeting to deal with matters for next year's show. A better method of judging the exhibits was considered desirable.

A series of lectures has been arranged for the winter months, and it is hoped the branch will become a power for good in the district.

Moss Vale.

The monthly meeting was held on 18th instant. The programme for the year was prepared, and it is hoped that one or two lectures and demonstrations will be given by officers of the Department.

It was agreed to apply to the Department for seed of different varieties of wheat, oats, barley, and rye, to be sown by several members who were prepared to give them special attention, and to harvest them for exhibition at the next local show.

Mullumbimby.

A meeting was held on 22nd April. Several members promised papers if the Bureau leaflet suggested by the Department was started. An interesting paper on banana-growing was read by Mr. J. J. Stewart; a portion of this paper follows. A discussion also took place on the growth of sweet potatoes. The branch is representing to the Department the importance of soil analysis on the banana plantations of the Tweed.

BANANA-GROWING.

My eldest son and I commenced planting bananas in November, 1913, on our farm on Mullumbimby Creek. The land is very rough and steep, but it proved to be an ideal place for banana-growing, as the soil is fairly good and the aspect is the right one, being north-east. We started planting without any previous experience, only knowing what we had read in pamphlets on the subject. However, we happened to strike the right method, as after experience proved.

The first thing we did was to brush, burn off, and clean up the portion we were going to plant, about 1½ acres, as we did not know if the land was suitable for banana culture. With the clearing finished, we commenced to dig the holes for the plants. We dug them about 14 inches by 12 inches, with 12 feet between the holes, and planted the suckers about 9 inches deep, and we have kept to that system ever since, and found it very good. The suckers we used then were largely composed of pieces of old corm with sprouts on them; others were only about 6 inches to 9 inches high, and a good many were very small. We found the piece of corm produced the best stalks and bunches, and the small plants produced much better bananas than the larger ones about 2 feet high. After the planting is finished the next thing is to keep the hoes going among the young plants. We have found that it is absolutely necessary to keep the young plants thoroughly chipped; for the first twelve months, at least, the more chipping the better the crop has been our experience.

The next thing is to know when and how to cut the fruit. We have found that the fruit takes about four months in summer and five in the winter after the bunch is fully out before it is matured. We generally leave the bunches until the sharp angles are gone, and the fruit is nice and round in appearance. We have also found that cutting off the flowers after the bunch is fully out is a mistake. We leave them to decay gradually of themselves, and by doing so we get much better bottom hands; this method also does away to a great extent with the "noblings" or small bananas at the bottom of the bunch.

The next most important thing is the packing, and how to place the fruit successfully on the market. We have tried various methods of packing, but we have found that the cross-packing is the best for the Sydney market. This consists of placing the bananas across the case in threes, four , and sixes, as the case may be, putting as few single bananas in the case as possible, and only when it is necessary to fill up the centre of the case, if the bananas should not be long enough to meet and go down the corners. We always pack a little higher than the case, to allow for shrinkage, and we find that our case opens up in good condition, as is proved by the fact that we have been getting the average top market prices since we started the business.

De-suckering, or cutting out the surplus plants, we have found to be the most important and most difficult work on the plantation; it can only be mastered by experience. We have found that the best plants to leave to form the stool is the one furthest away from the parent stalk. We have found that the best way to get good fruit is only to allow the original plant and two suckers to grow during the first year if the soil is fairly good; in poor soil one sucker is all that should be left.

The second year one more stalk may be left. We have found that from four to five stalks is the best number to have in the permanent stools; sometimes they exceed that number, to the detriment of the fruit.

We have had no diseases until about a year ago, when "bunchy top" began to make its appearance. We have been cutting the diseased plants out as we found them, until the sulphur treatment was discovered. We have been treating "bunchy top" with the sulphur, but we have not yet had sufficient time to know the result. However, sulphur seems to be proving effectual on some plantations on the Tweed.

We have found that we have got better returns from an acre of bananas than from any other crop we could have grown, and, taking them acre for acre with dairying, they can beat it by a good margin.

We have no hesitation in stating that if anyone can get a suitable piece of land with good soil, the right aspect, and well sheltered from the west and south winds, with good attention to all the details of the culture, banana-growing can be made a very successful industry.

DEPARTMENTAL NOTE.—The Fruit Expert remarks that the practical experience related in this paper is of the greatest interest, but it is too early to deduct anything from the use of sulphur for the control of bunchy top.

North Berry Jerry.

The monthly meeting was held on 25th April. A good deal of interest was taken by the meeting in the Coolamon A. and P. Society, and the members were sympathetic with an effort to place that society's show on a sound footing. It was felt that there was scope in the Coolamon district for live branches of the Bureau.

Among other matters discussed were needed repairs to the roads in the vicinity, the location of the captured gun that had been allotted to the district, and the erection of a memorial hall.

Oberon.

At a meeting held on 2nd April papers on pea-growing were read by Messrs. G. W. Kelly, S. Badcock, and F. Wilson. The papers are summarised in the following :—

PEA-GROWING.

Mr. G. W. KELLY.—In the Department's experiment plots, two-thirds of an acre was sown on 23rd December, 1920, as a trial for varieties and manure.

Hundredfold was an early dwarf variety that matured in sixty days on 23rd February. Its yield was low, viz., 44 bushels per acre. It was a light green colour, and not a good seller.

Richard Seddon was sown and pulled on the same date as Hundredfold. It yielded 56 bushels per acre, and was two or three shillings per bushel better in price. It was an early variety and well worth a trial.

American Wonder yielded 68½ bushels per acre. It was one of the best sellers, but was a little late, being pulled on 2nd March.

William Hirst yielded 72 bushels per acre. It had a longer pod; was a dwarf variety.

Nottingham Defiance yielded 120 bushels to the acre, and was pulled on 9th March. It was the best yielder, and was a cross between the Green pea and Stratagem.

Stratagem was a good colour, but was large and soft, and was not a good market pea.

Green pea yielded 75 bushels per acre, and was pulled on 8th March. It was a good seller, but the yield was not so good. Every pod was filled from end to end, and was a good colour.

Yorkshire Hero was used for manure tests. These were pulled on 2nd and 10th March, and the results were :—Superphosphate, 2 cwt. per acre, 112 bushels per acre; P 7, 96 bushels per acre; no manure, 85¾ bushels per acre; P 5, 114 bushels per acre. This last manure is more expensive and contains potash. Ten plots averaged 84 bushels per acre. The land had been cultivated for twenty-five years, and for the last fifteen years had been growing rye.

The seeding was rather light—64 lb. to the acre. The seed did not germinate very well, which accounts for the yields being small.

In answer to a question, Mr. Kelly did not think there was any danger to the plant if manure up to 4 cwt. per acre was used. The stalks made excellent feed for milking cows.

Mr. S. Badcock.—He found green seed the best. He had planted English Wonder, which came up in nine days, and Yorkshire Hero seed, which was dried white, and only about one-half came up in fifteen days. He planted seventeen rows 100 yards long.

Yorkshire Hero yielded 28 bushels, and sold at 9s.; English Wonder yielded 21½ bushels, and sold at 16s. per bushel.

He left 2 feet between the rows so as to use the scarifier. He found 1½ bushels per acre was sufficient. If 2 bushels were sown the growth was too thick and the pods did not grow as long and did not fill out. He planted 4 inches deep this year, but if wet he would plant 2 inches. He saved the stalks of 3 acres of Yorkshire Hero, and the cows preferred it to wheaten hay and milked better on it. He ploughed six months before sowing and fallowed, and then three weeks before sowing he ploughed again.

His crops averaged 84 bushels to the acre, at 10s. per bushel.

Mr. F. Wilson.—He had ploughed up ground 9 inches deep, but had brought up the subsoil and spoilt the ground for potatoes. He had obtained at the rate of 204 bushels per acre by planting double rows 8 inches apart and 2 feet 6 inches between each double row.

Dwarf Champion grew 18 inches high, and yielded better than Yorkshire Hero, and sold 1s. a bushel better.

Mr. Gilmore said a friend of his at Lowther had a machine for planting peas in double rows.

At a meeting on 21st April, Mr. W. Franklin was elected Chairman, and Messrs. J. P. Ryan, G. W. Kelly, J. Gilmore, S. Badcock, and E. Humphries, were elected a committee, with Mr. C. S. Chudleigh as Hon. Secretary. A series of rules was submitted to the meeting. Mr. G. N. Falls offered a prize for the best sample of Early Rose potatoes, to be judged at next meeting. Mr. G. A. Batchelor made a similar offer in respect of Satisfaction, and Mr. Franklin the same for Manhattan, the competitions to take place at succeeding meetings.

A paper was read by Mr. J. Gilmore on potato-growing. A summary follows :—

POTATO-GROWING.

The three most important things for success were :—(1) Clean seed; (2) good marketing varieties; (3) good ground.

The seed should be selected when digging the previous crop. It becomes difficult to judge varieties when the skin is faded. Varieties received from merchants could not always be depended on. A variety was running out when the eyes became larger and the flesh yellow or red. He had seen quite different varieties of seed sold as the same kind, and advised beginners to get someone with experience to choose for them. Nothing smaller than a hen egg was the best for seed. Large potatoes cut sometimes missed in dry weather and sometimes rotted in wet weather. He would select the good shaped ones when digging once in three or four years, and sow in a special place for seed purposes.

Small potatoes were sometimes run out and these would produce only potatoes of seed size. Cut potatoes should be left a day or two in the sun scattered about, not stacked in heaps, or they might heat.

Mr. Gilmore always believed in the red skins, as the white kinds were hard to sell. Early Rose was always marketable. He had grown 15 tons to the acre on chocolate soil between the slate and granite country. He had grown crops three years in succession from the same ground, and then by fallowing in alternate years, for another six years. If the soil is stiff it should be worked between the rows until the stems are too big.

Penrose-Kareela.

At the monthly meeting, on 11th April, formal business was transacted, and some of the exhibits and awards at the Sydney Royal Show were discussed.

Stratford.

On 16th April Mr. Miller gave an interesting demonstration of tomato culture, producing specimen plants and showing how they should be pruned. He believed in pruning and trellising to get the best results. The soil on which the plants were grown was of very poor quality, being a very stiff clay, but Mr. Miller used artificial fertilisers liberally, and one plant had reached a height of 12 feet, and had borne fruit of excellent quality.

Sydney (Metropolitan).

A largely-attended meeting of this branch took place on 27th April, when Sir Joseph Carruthers presided. Cinematograph pictures were shown, supplemented by addresses by Messrs. W. S. Campbell and H. E. Laffer, on vine growing and wine making. A demonstration and test of canned and dried fruits was also conducted, and the whole evening was regarded as a very valuable and propitious one.

Tahmoor.

The inaugural meeting of this branch was held on 14th April, when the following officers were elected :—Chairman, Mr. G. R. Stewart ; Vice-Chairman, Mr. W. A. Miller ; Treasurer, Mrs. E. Paterson ; Joint Hon. Secretaries, Messrs. A. G. Miller and A. Crane. Meetings will be held monthly, and the subscription has been fixed at 2s. 6d. per annum.

Tennyson-Kurrajong.

The monthly meeting was held on 4th April, when Mr. V. S. McMahon gave an address on pea-growing in the Kurrajong district. Though not posing as an expert, he grew 70 acres annually. He had given nearly every sort a trial, and had found Yorkshire Hero the most suitable for the district, and placed Senator, Greenfeast, and Wonder, in that order. He advised sowing from the middle of April for autumn and winter peas. The picking would last from May to September. The drills should be run from east to west ; seed 1 or 2 inches apart, and drills 3 inches deep. He sowed 1 bushel per acre of a small variety, and 1½ bushel of larger sorts, using 5 cwt. of manure (preferably bonedust) per acre.

Thyra-Bunaloo.

The monthly meeting was held on 16th April. A discussion took place on the weed stinkwort, which is beginning to invade the district from Victoria.

Toronto.

At a meeting on the 12th April, Mr. H. Filmer afforded interesting information on spraying citrus for white wax and red scale.

It has been decided to form a ladies' committee in connection with this branch.

Wallsend.

At a meeting on 18th April, the greater part of the evening was spent discussing the commencement of a wholesale purchasing department, and efforts are being made to secure the co-operation of other branches in selecting one buyer for members.

Warrah Creek.

The branch at its meeting on 21st April decided to endeavour to obtain an acre of land for the erection of a sheep dip on the Warrah Creek Reserve, the settlers to do the work themselves. An effort is also being made to secure the establishment of farmers' experiment plots in the district. The branch has also interested itself in local roading, the recreation ground, the erection of a local hall, and the proclamation of stinkwort as a noxious plant.

AGRICULTURAL SOCIETIES' SHOWS.

Secretaries are invited to forward for insertion in this page dates of their forthcoming shows; these should reach the Editor, Department of Agriculture, Sydney, not later than the 21st of the month previous to issue. Alteration of dates should be notified at once.

Society.	Secretary.	Date.
1921.		
Murrumbidgee P. and A. Association (Wagga)	A. F. D. White	Aug. 23, 24, 25
Forbes P., A., and H. Association	E. A. Austen	,, 23, 24
Corowa P., A., and H. Society	J. D. Fraser	,, 30, 31
Grenfell P., A., and H. Association	G. Cousins	,, 30, 31
Young P. and A. Association	T. A. Tester	Sept. 6, 7, 8
Albury P., A., and H. Society	A. G. Young	,, 6, 7, 8
Gunnedah P., A., and H. Association	M. C. Tweedie	,, 6, 7, 8
Hills District Fruitgrowers' Association (Galston)	B. F. Renant	,, 10
Cowra P., A., and H. Association	E. P. Todhunter	,, 13, 14
Cootamundra A., P., H., & I. Association	C. H. Inson	,, 14, 15
Northern A. Association (Singleton)	J. T. McMahon	,, 15, 16, 17
Holbrook P., A., and H. Society	J. S. Stewart	,, 20, 21
Temora P., A., H., and I. Association	A. D. Ness	,, 20, 21, 22
Henty P. and A. Society	H. Wehrman	,, 27, 28
Junee P., A., and I. Association	T. C. Humphreys	,, 27, 28
Murrumburrah P., A., and I. Association	W. Worner	,, 27, 28
Deniliquin P. and A. Society	P. Fagan	,, 28
Hay P. and A. Association	C. L. Lincombe	Oct. 5, 6
Narrandera P. and A. Association	W. Canton	,, 18, 19
Tweed River A. Society	T. M. Kennedy	Nov. 16, 17
Lismore A. and I. Society	H. Pritchard	,, 23, 24
1922.		
Kiama A. Society	G. A. Somerville	Jan. 25, 26
Shoalhaven A. and H. Association	H. Rauch	Feb. 8, 9
Guyra P., A., and H. Association	P. N. Stevenson	,, 21, 22
Newcastle A., H., and I. Association	E. J. Dann	,, 22 to 25
Tenterfield A. Society	E. W. Whereat	,, 28 and March 1, 2
Berrima District A., H., and I. Society	W. Holt	,, 2, 3, 4
Glen Innes P. and A. Society	Geo. A. Priest	,, 7, 8, 9
Campbelltown A. Society	J. T. Deane	,, 10, 11
Tamworth P. and A. Association	F. G. Callaghan	,, 21, 22, 23
Hunter River A. and H. Association (Maitland)	E. H. Fountain	,, 22 to 25
Camden A., H., and I. Society	C. C. Irving	,, 23, 24, 25
Royal Agricultural Society of N.S.W.	H. M. Somer	April 10 to 19

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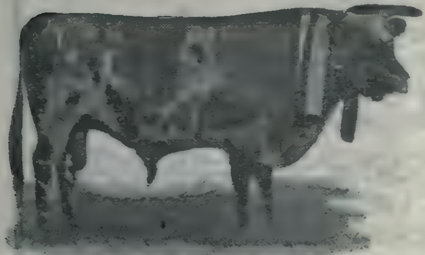

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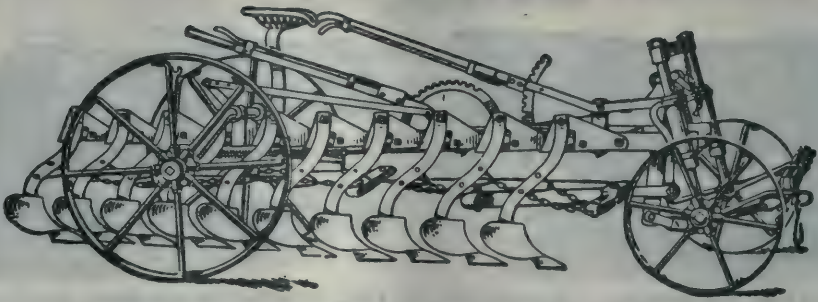

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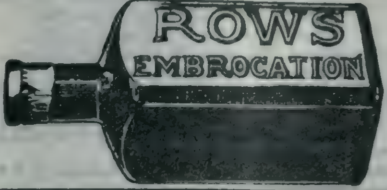

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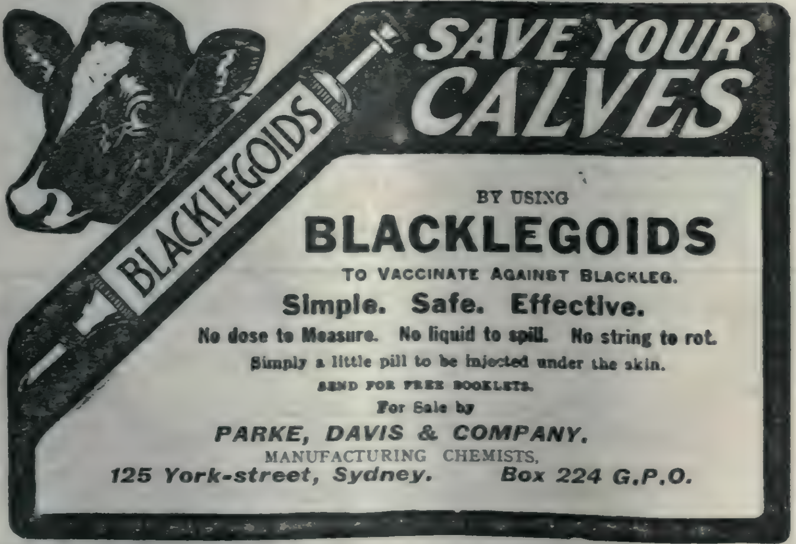

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				1920.	
636	Berkshire Sow ...	Koramburra Major, No. 520a	Callan Park Lady, No. 520c	Oct. 17	7 7 0
646	Berkshire Sow ...	Callan Park Dan, No. 600a	Callan Park Lucy, No. 520d	Nov. 2	7 7 0
647	Berkshire Sow ...				
648	Berkshire Sow ...				
654	Berkshire Sow ...	Koramburra Major, No. 520a	Callan Park Patsy, No. 484	Nov. 8	7 7 0
655	Berkshire Sow ...				
				1921	
657	Berkshire Boar ...	Callan Park Dan, No. 600a	Callan Park Dewdrop, No. 500	Mar. 14	6 6 0
658	Berkshire Boar ...				
659	Berkshire Boar ..				
660	Berkshire Boar ...				
661	Berkshire Sow ...				
662	Berkshire Sow ...				
663	Berkshire Boar ...	Callan Park Dan, No. 600a	Callan Park Burra, No. 582	April 16	6 6 0
664	Berkshire Boar ...				
665	Berkshire Boar ...				
666	Berkshire Boar ...				
667	Berkshire Boar ..				
668	Berkshire Sow ...				
669	Berkshire Sow ...				
670	Berkshire Boar ...	Callan Park Dan, No. 600a	Callan Park Lucy, No. 520d	April 27	6 6 0
671	Berkshire Boar ...				
672	Berkshire Boar ...				
673	Berkshire Boar ...				
674	Berkshire Boar ...				
675	Berkshire Boar ...				
676	Berkshire Sow ...				
677	Berkshire Sow ...				
678	Berkshire Sow ...				
679	Berkshire Sow ...				

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2527	Large York. Boar	Hawkesbury Ferryman	Gladesville Empress V	Sept. 30	13	13	0
2550	Large York. Sow	Hawkesbury Ferryman	Brighton Lass ...	Nov. 29	11	11	0
2561	Berkshire Sow ...	Whitley Wales (Imp.)	Gladesville May ..	Dec. 22	12	12	0
2564-65	Large York. Sows	Hawkesbury Ferryman	Brighton Lady ...	Dec. 22	10	10	0
2569	Large York. Boar	King Charles II...	Gladesville Lady..	Dec. 22	11	11	0
2571-72	Large York. Sows				10	10	0
				1921			
2577	Berkshire Sow ...	Whitley Wales (Imp.)	Goomalibee Patricia	Jan. 10	11	11	0
2578	Mid. York. Boar	Gladesville Sundon	Gladesville Lila ...	Jan. 20	11	11	0
2580-81	Mid. York. Boars				11	11	0
2584-5-6	Mid. York. Boars	Gladesville Sundon	White Rose ...	Jan. 20	11	11	0
2587	Mid. York. Sow				10	10	0
2592-93	Berkshire Sows ...	Wodonga Pat	Gladesville Queen III	Jan. 21	10	10	0
2597	Berkshire Boar ...		Tarban Jane II	Jan. 24	10	10	0
2600-1	Berkshire Sows ...	Wodonga Pat	Herrison Queen IV	Feb. 6	10	10	0
2603-4-5	Berkshire Sows ...		Gladesville Duchess III	Feb. 6	10	10	0
2608-9-10	Berkshire Sows ..	Whitley Wales (Imp.)	Herrison Queen III	Feb. 8	11	11	0
2616-17	Mid. York. Boars	Sundon Sydney (Imp.)	Gladesville Snowdrop..	Mar. 26	10	10	0
2618-19	Mid. York. Sows				10	10	0
2620-21	Large York. Boars	King Charles II...	Gladesville Bourne III	Mar. 12	10	10	0
2622-23	Large York. Sows				9	9	0
2624-25	Berkshire Boar ...	Whitley Wales (Imp.)	Tarban Jane	April 27	11	11	0
2626	Berkshire Sow ...				10	10	0
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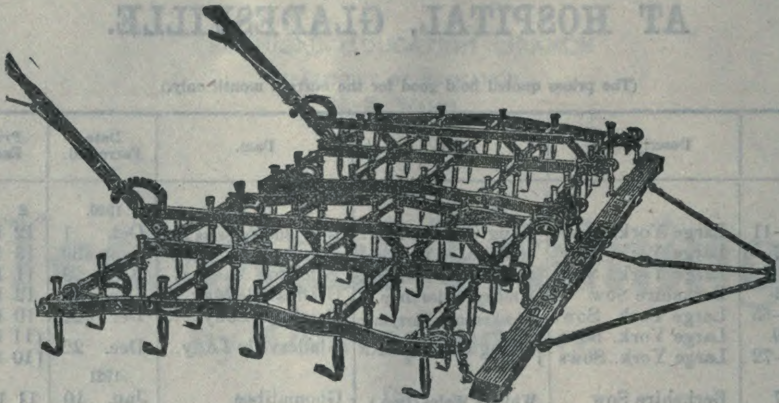

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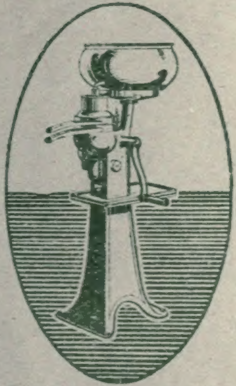

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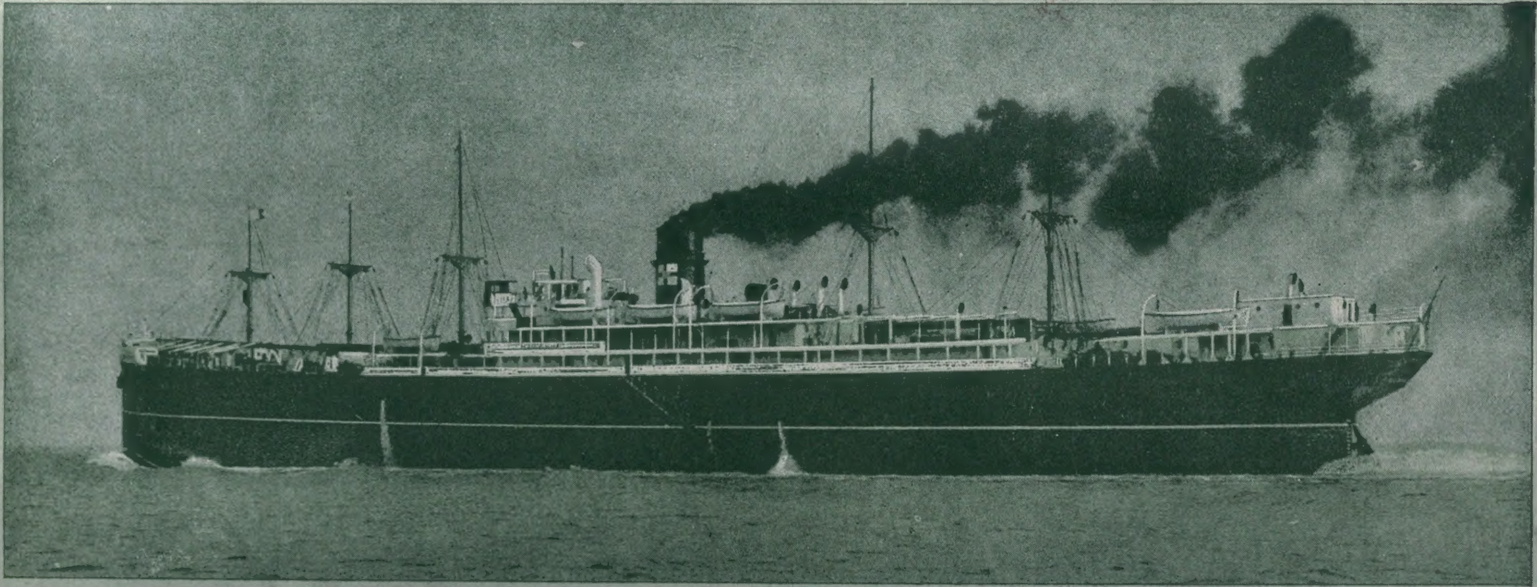

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